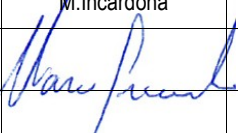


## PHARMAGEL ENGINEERING SPA

## GK 72 ENCAPSULATION LINE

SUPPLIED TO

*Machine preparation, start-up and Maintenance MANUAL***Document No: 2144\_2009\_M\_09\_10**

CURRENT ISSUE			
Issue No: 0	Date:	Reason for Issue: For comments	
Sign-Off	Issued by	Reviewed by	Approved by
Print Name	M.Lambri	M.Incardona	E.Peviani
Signature			
Date			

PREVIOUS ISSUES (Type Names)					
Issue No.	Date	Issued by	Reviewed by	Approved by	Reason for Issue
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Document N°: 2144_2009_M_09_10	Equipment SN: GK72101005
Author: M.Lambri	Data: 06 Sep 2010

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*Every effort has been made to ensure the accuracy of this document.  
However, the information contained herein is subject to change without notice.  
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## 1 General specifications

### 1.1 Technical specifications

#### GK 72 Encapsulation machine

Serial number	GK72101005
Manufacturing year	2010
Loudness	<75dB
Dimensions	1486x2385x2022 (h) mm
Weight	1200
Maximum speed	8 rpm

#### Tumble Dryer

Overall dimensions	N° 2 unit 2090x1399x1317 (h) mm
Tumble speed	0 – 24 rpm

#### Electrical panel

Line voltage requested	400 V 50 Hz 3 phases + N + G
Power	27 KVA
Safety device	IP 55

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## 1.2 Working conditions

<b><i>Installation room specifications</i></b>	
Temperature:	22-24 °C
Relative humidity:	15-20%
<b><i>Product specifications</i></b>	
Gelatine viscosity:	9000-14000 cps at 60 °C

## 1.3 Safety devices

The safety switches are in the machine side panel ; turn the motor power off when the electrical panel is open, leaving the auxiliary tensions on.

<b>IT'S DANGEROUS TO REMOVE OR CHANGE THE SAFETY DEVICES</b>
--

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## 2 Installation

### 2.1 Moving method and conditions

All the equipment is forwarded in wooden boxes .

All the machines are fixed on the box bottom by crossed wood sticks and completely enveloped in plastic foils.

The outfit accessories and spare parts are packed in carton boxes.

If the equipment needs to be packed , all the machines must be fitted in their wooden box in the same way as previously specified (see packing list in VTOP package).

During the unpacking operation, please check the supply carefully; all the components must be verified in the shipment documents.

If any piece of equipment is missing or damaged , please immediately contact Pharmagel Engineering Spa , and emit the reserve in the forwarder documents.

The equipment is provided with directional wheels so that it can be moved without any additional device.

Lift the equipment with a system suitable and adequate to its weight and size . It must be moved with caution and placed to avoid any damage and/or crash.

<p><b>During the lifting time , please be sure the equipment is firmly fixed in order to avoid any accidental fall and/or turn upside down</b></p>
--

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## 2.2 Installation room conditions

The equipment must be installed at atmospheric pressure; the air must not include aggressive particles, and maximum humidity must not damage any instrument.

The installation room must be provided of fire safety equipment ; the user must install all the adequate safety and controls systems, preventing also external accidents.

Please consider the following place conditions:

- Do not expose the equipment to rain;
- Do not use equipment in humid or wet rooms:
  - Humidity max: 85%
  - Room temperature: 15-40 °C
- Installation room must have a good lighting;
- Keep the floor dry clean ,without oil or dirt spots

## 2.3 Installation and first check

The power line must be placed in room before the equipment installation, in order to be ready for connection at the equipment installation .

Procedures at the first start up:

1. Please verify and remove all the safety packing system; then carefully clean all the equipment;
2. Place the equipment in the chosen position;
3. Connect the equipments to all the Utility as in the drawings and P&ID attached.
4. Connect the electrical wires as in the drawings attached and check them again; start the motors for a rotational test. The cables connections must comply with the RST polarization standard

**Attention : the machine can be seriously damaged by an incorrect phase connection**

**DO NOT APPLY POWER AND DO NOT MOVE ANY PIECE WITHOUT OUR TECNICIANS CONSENT**

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## 2.4 Precautions

- a) The power supply must comply with specifications set in the functional design specifications data , and the must not be different of more than 5% of the nominal voltage.
- b) Avoid any wrong usage of the electrical cable, install only cables of section appropriate to the power installed . The power cable must not be handled to pull out the plug from the socket . Protect the cables from high temperature, oil and sharp edges. Use power cable extension only if approved and marked.
- c) All the instruments and equipment must be protected from stray currents ,electrostatic differential and/or potential, by adequate protection instruments and/or ground connections and electrical coupling connections.
- d) The user is obliged to verify all the safety devices for each installation and for any used fluid.

## 2.5 Correct operations and not allowed operations

All the equipment must be installed and used in respect of the rules in force in the installation country ; the user must be aware and apply all of them.

The machine builder do not take upon himself any responsibility for any damage that may occur to people, object , or installations due to inappropriate use of the equipment.

The user must not put inside the machine any raw material at a temperature different from the minimum and maximum design temperature.

It is forbidden to put inside the machine any raw material and/or mixture that will eat into, rust and/or corrode the contact surfaces.

It's forbidden to use compressed air and any diesel oil and/or solvent spray.

The constructor is not responsible for any damage produced by inflammable and/or explosive materials introduced or used in the equipment if it was not designed for them.

It's forbidden to modify in any way the equipment, it's own functions and the technical documentation attached, unless given authorization from the machine builder; please take care of this maintenance and usage manual as it will match all the machine lifetime.

Do not remove any avalanche protector.

It's forbidden to put anything inside the motor's cover and to shut the power OFF bypassing the main switch.

The workers must remark to their people in charge any malfunction and/or any possible dangerous situation , avoiding any operation out of their knowledge .

The workers must inform the machine builder about any fault in the accident-prevention procedures or in any estimated dangerous situations.

All the maintenance operations must be performer at atmospheric pressure and the machine must be isolated from the main power.

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It's forbidden to put any load on the equipment.

The equipment must not be exposed to a possible hydraulic ram.

## **2.6 Unavoidable dangers**

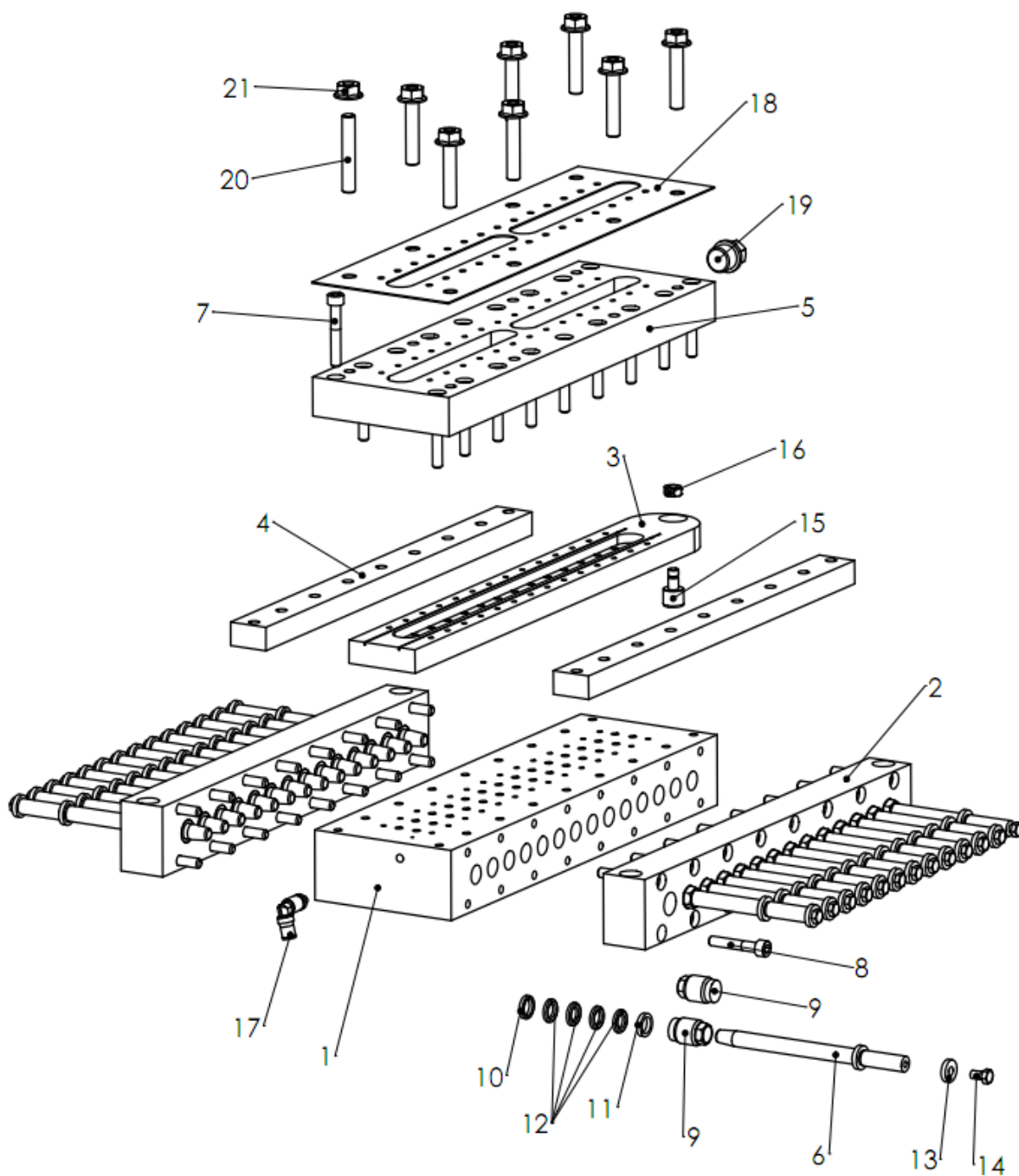
The worker must pay attention to the risk of possible leakage current in the main switch, in the operational panel .

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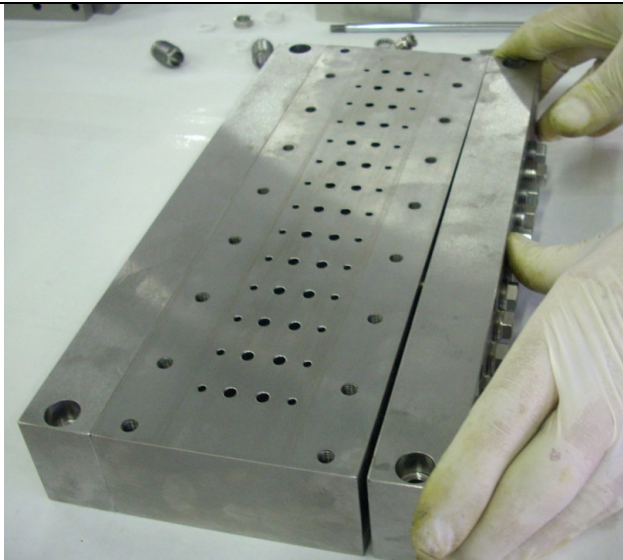
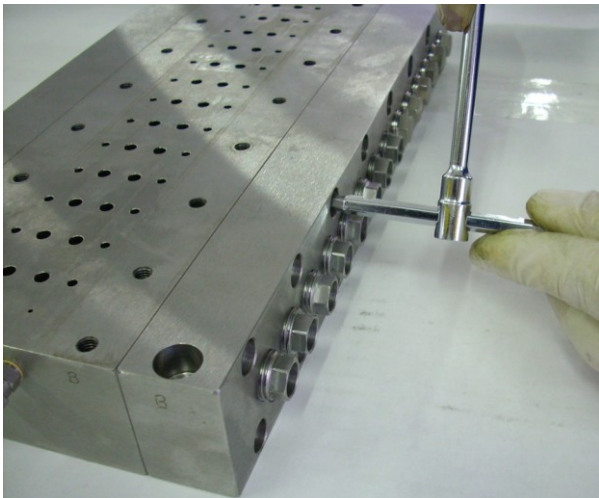
### 3 Machine Set-up

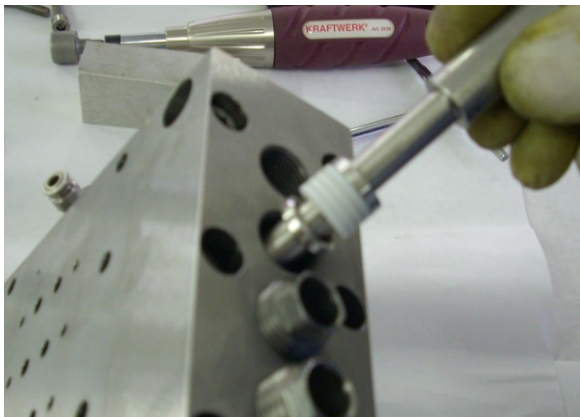
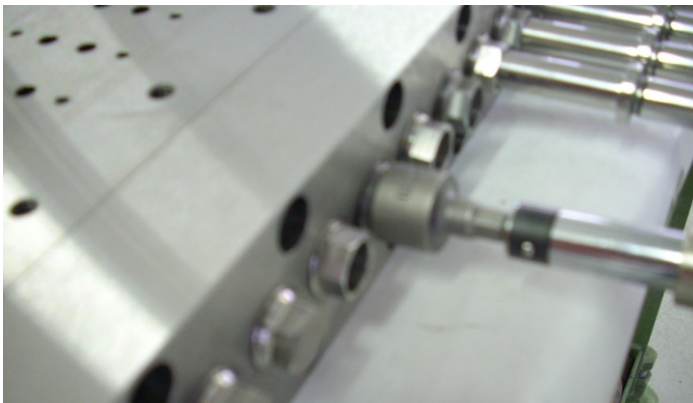
#### 3.1 Fill Block Pump assembling procedure

Refer to the following scheme in order to proceed with disassembling action :

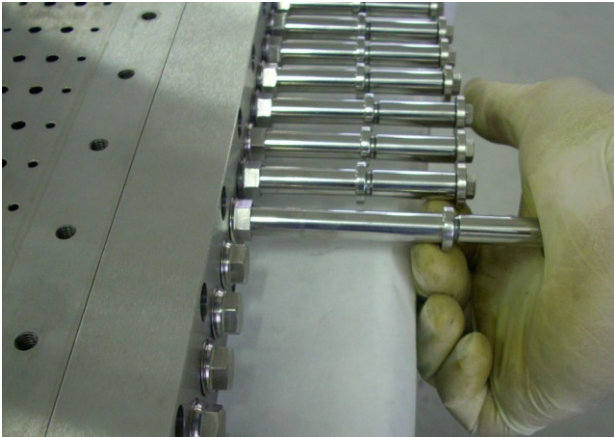
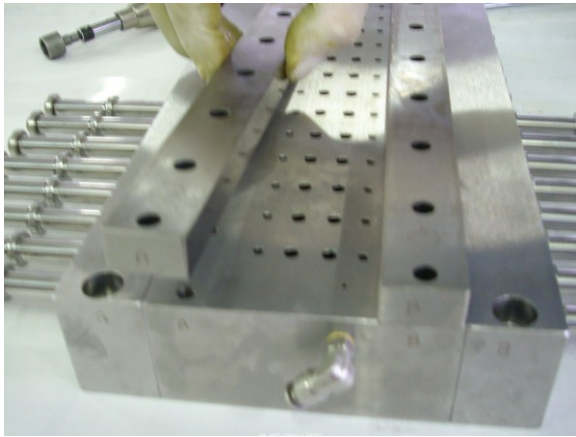


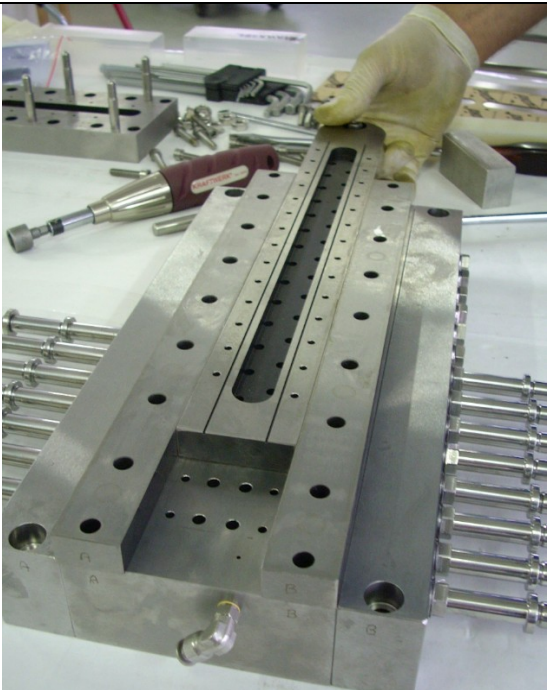
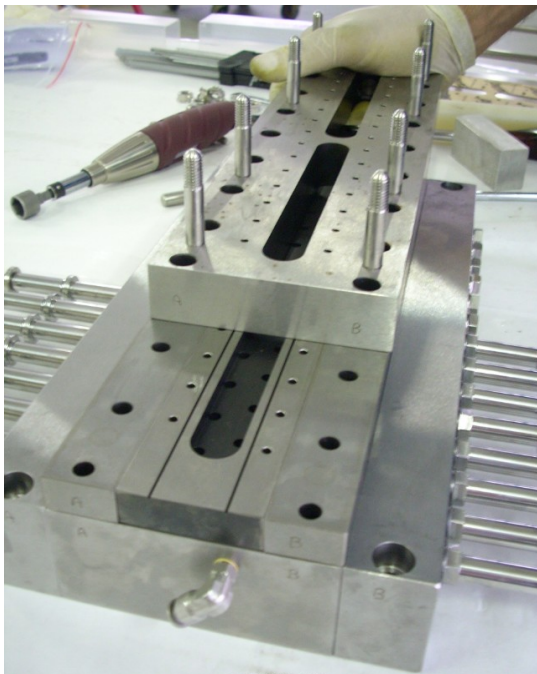
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1-BANKS assembling	2- BANKS assembling trough SOCKET HEAD SCREW
	

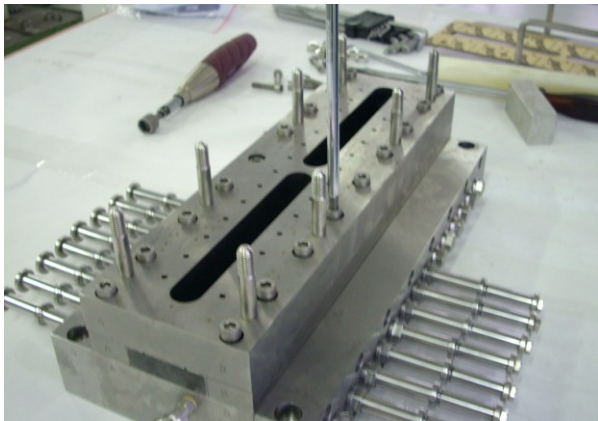
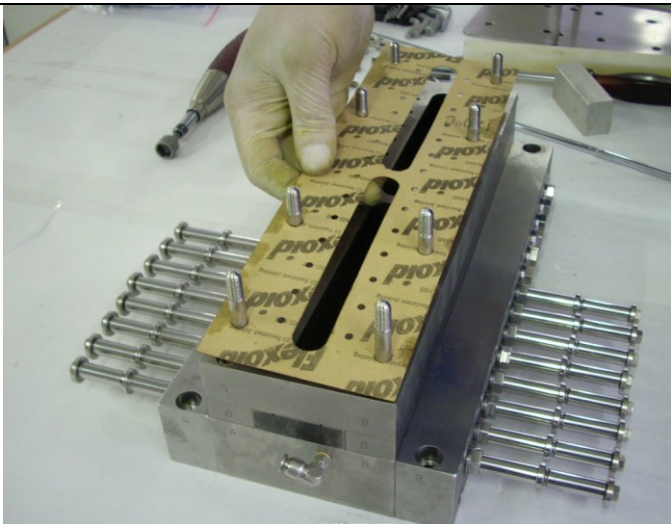
3- assembling INSIDE & OUTSIDE WASHER , PLUNGER SEAL	4- Tight the screw with appropriate key
	

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5- PLUNGERS insertion	6- SIDE PLATE assembling
	

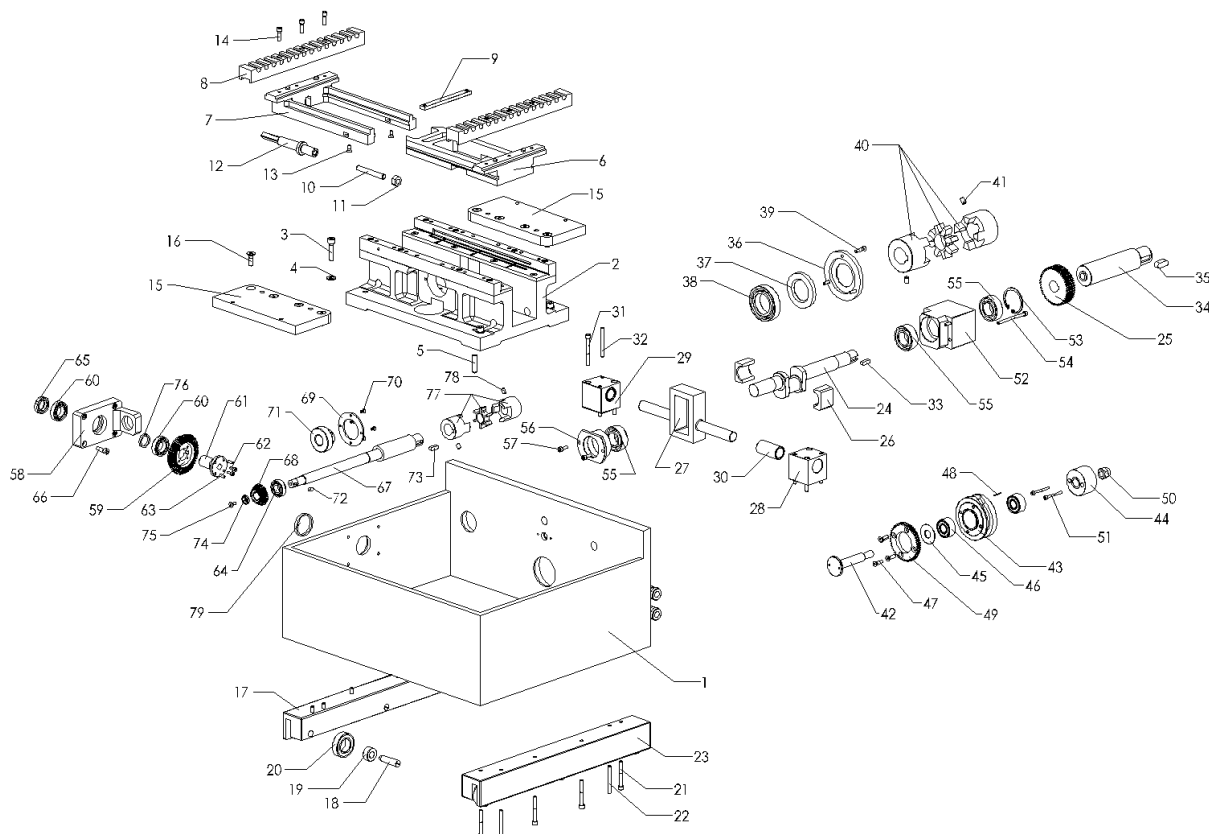
7- SLIDE VALVE assembling	8- TOP PLATE assembling
	

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9- Fix the screw on TOP PLATE	10- gasket positioned
	

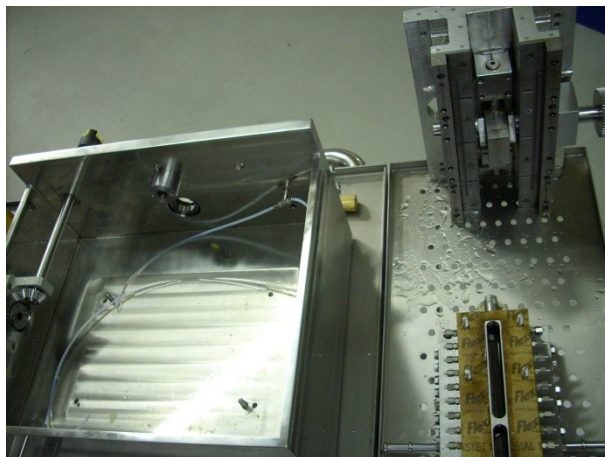
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## 3.2 Fill pump housing assembly

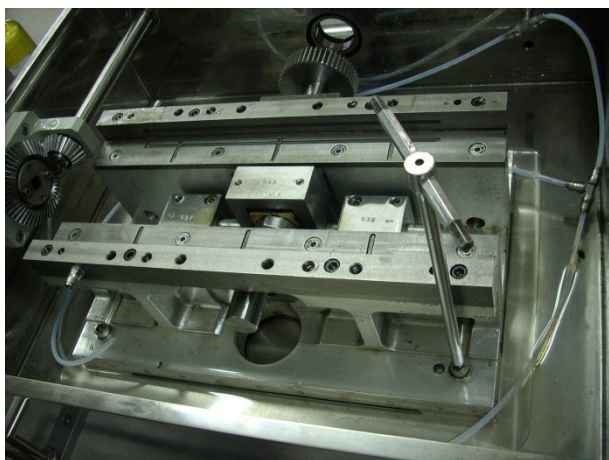


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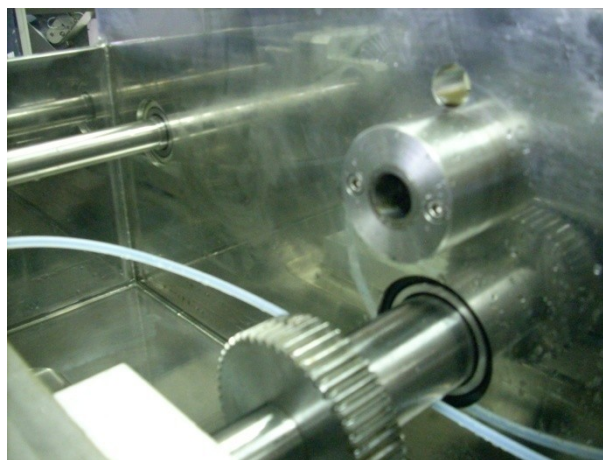
1-Pump housing completely dismantled



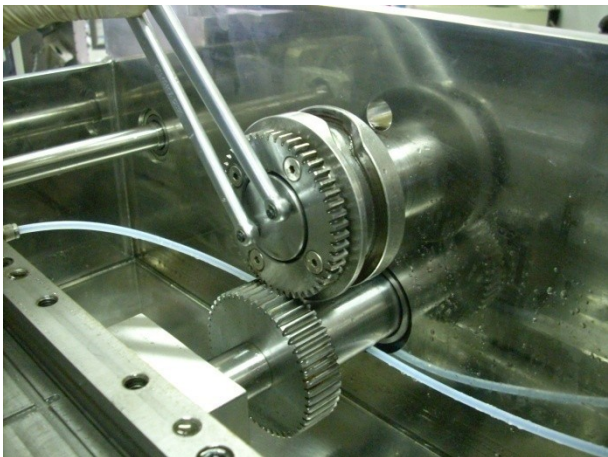
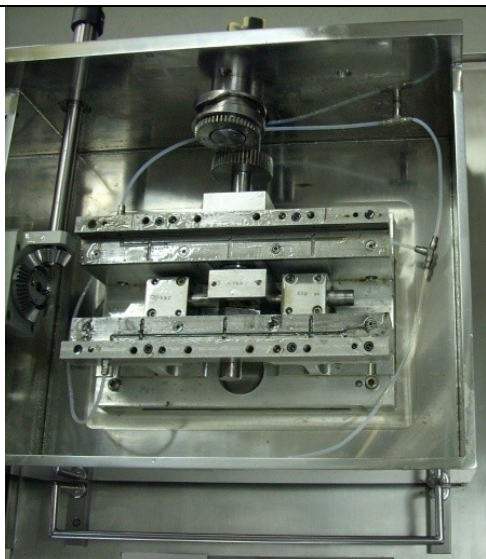
2-Fix the pump housing block (ref. 2) and tight

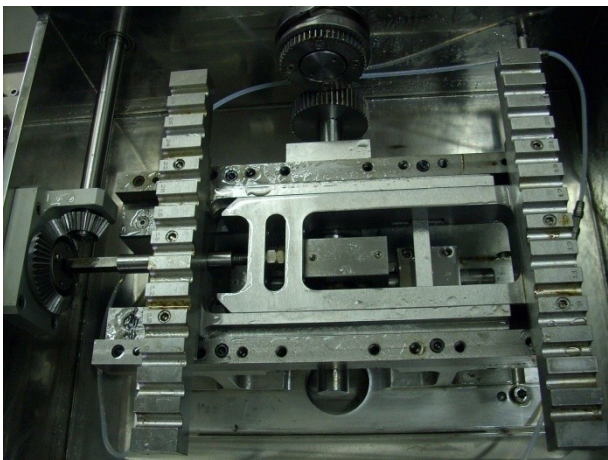
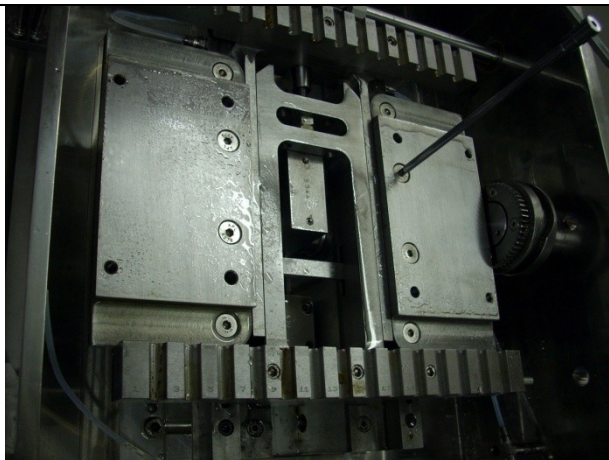


3-View of the pump housing shaft (ref. 24)



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4-Fix the cam (ref 43) with the special compass key.	5-Top view of the pump housing assembled
	

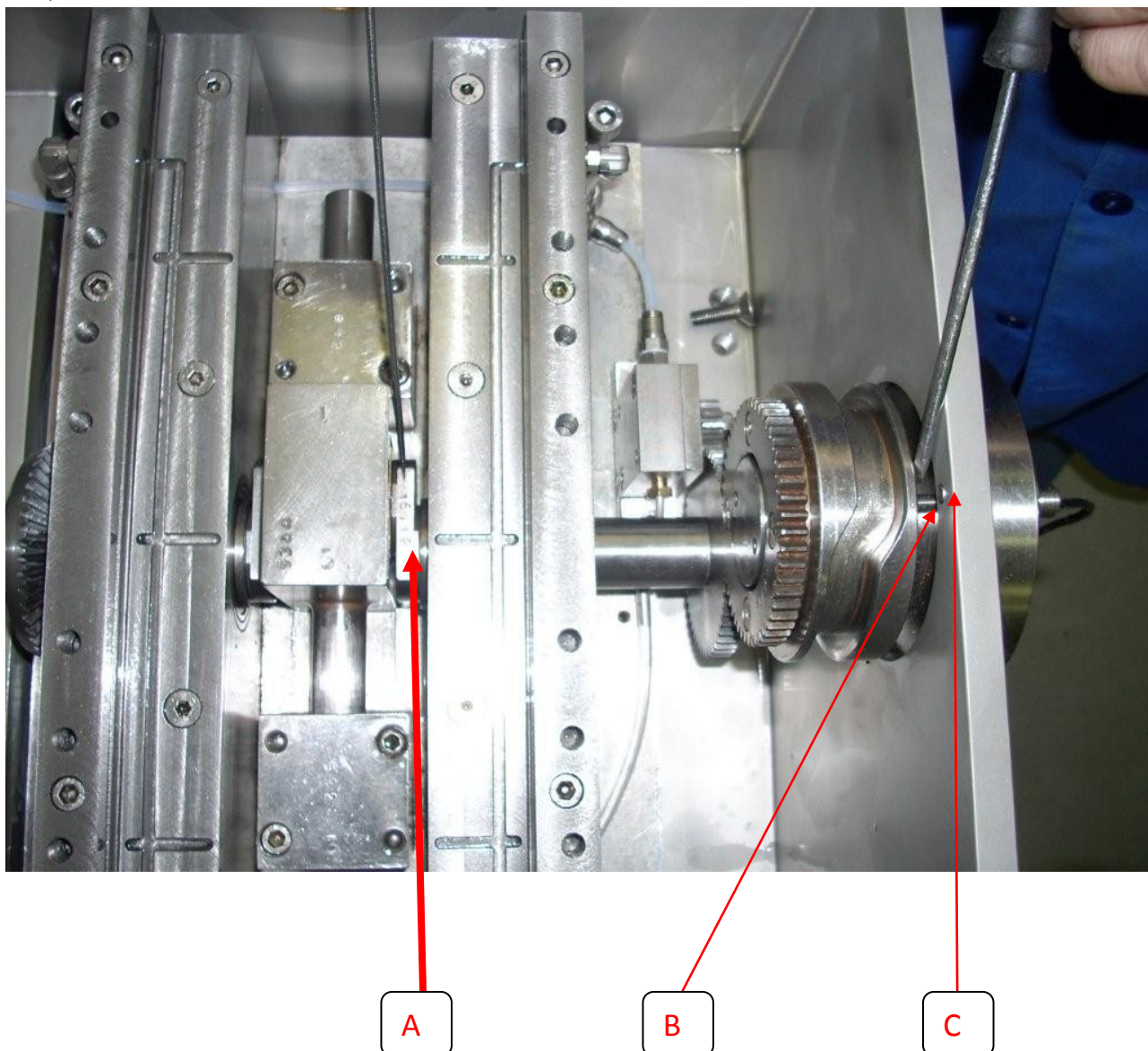
6-Install the two slide (ref. 6 and 7) and the two yoke bracket left and right (ref. 8) and tight.	7-Install the two pump block support left and right (ref. 15) and tight.
	

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### 3.3 Fill pump housing synchronization

Check the fill pump housing alignment as shown

The photo shows a correct installation



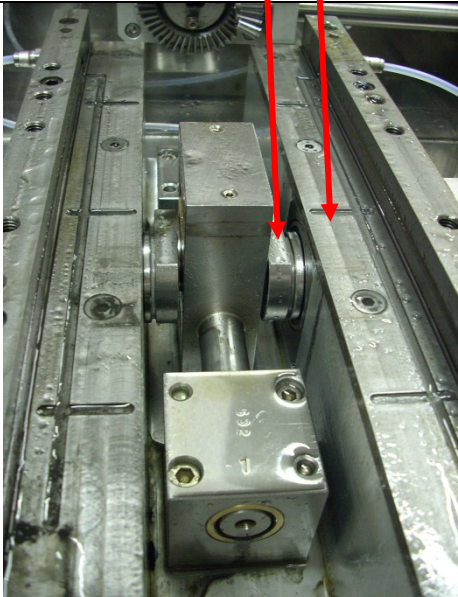
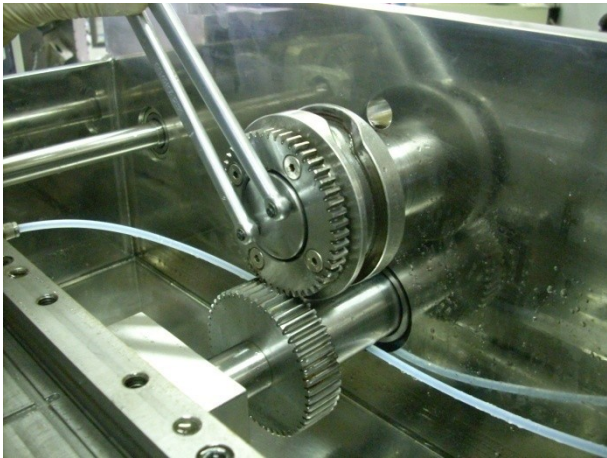
Please verify in your pump housing that :

The crank shaft **A** must be parallel to the guide on the right handside ; at the same time the 'guide pin' **B** on the cam must be aligned with the 'zero point' sensor **C** and the hole in the front.

If the 'zero point' sensor is then aligned correctly with the 'guide pin' ,please push the relevant button on the machine and the led will light up to confirm .

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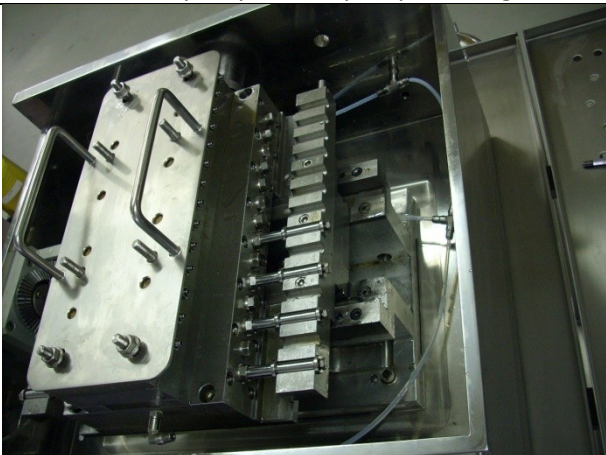
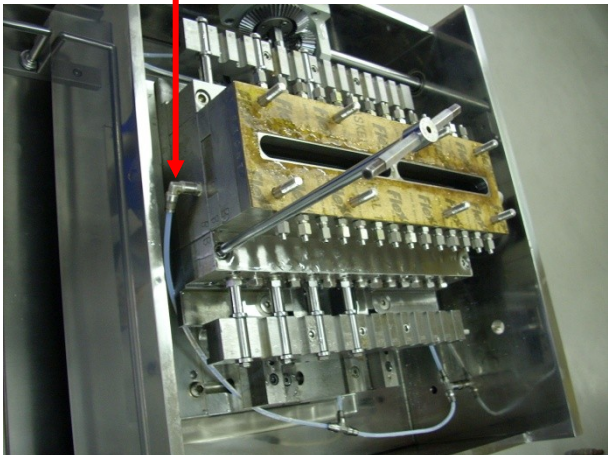
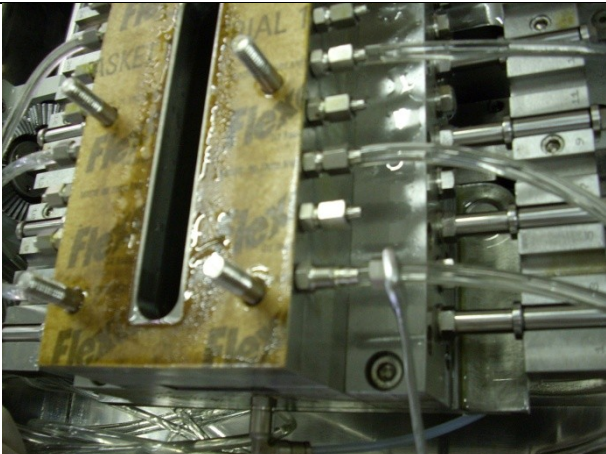
To synchronize the medicine pump housing please proceed as follows :

1-The crank shaft must be parallel and horizontal as the guide on the right	2-Unscrew the cam central pivot with a compass key
	

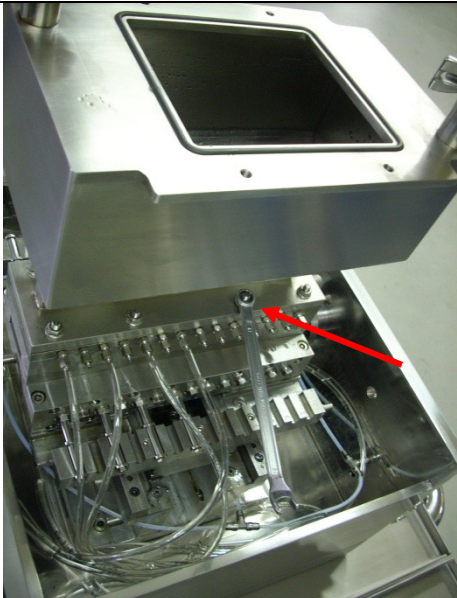
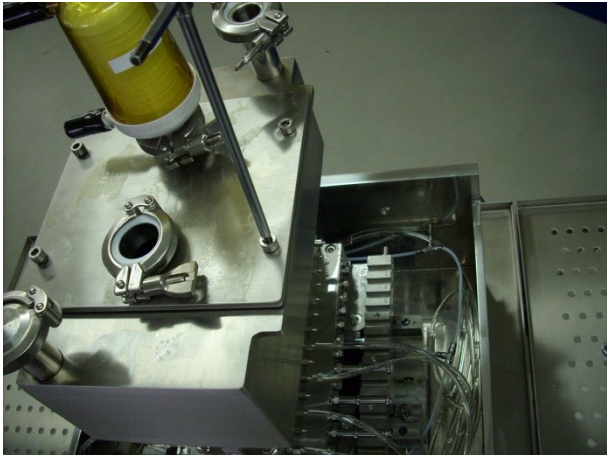
Align the cam 'guide pin ' to the hole on the housing and relevant sensor , then screw the cam central pivot with a compass key.

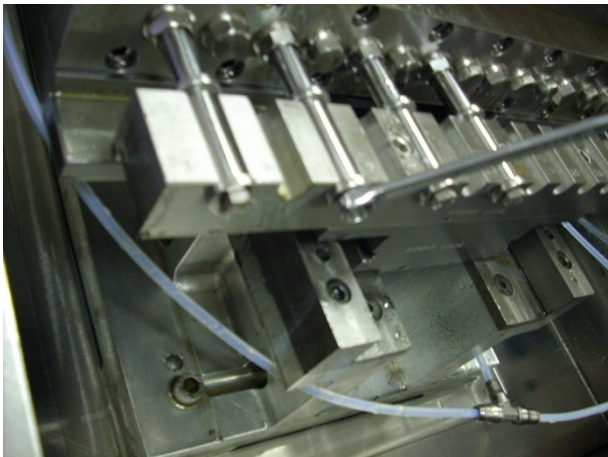
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### 3.4 Fill pump and pump housing coupling

1-Lift the fill pump using the support frame supplied	2-Install the fill pump on the pump housing.
	
3-Tight the four screw to fix the fill pump. Insert the lubrication pipe with the quick connection device (red arrow).	4-Insert the medicine flexible pipes and put the gasket.
	

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5-Fix the fill hopper by tighten the screw.	6-Put the fill hopper cover and the air filter if necessary (see fill line preparation section).
	

7-Fasten all the plunger retaining nut


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### 3.5 Die roll coupling housing

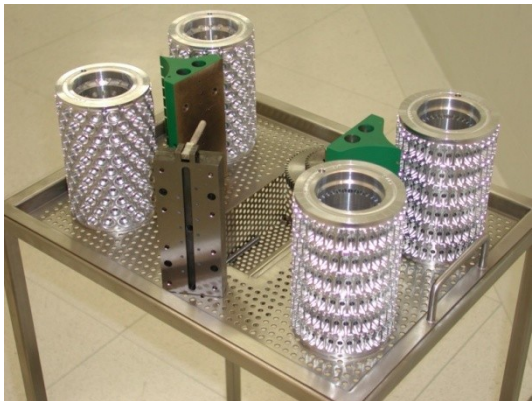
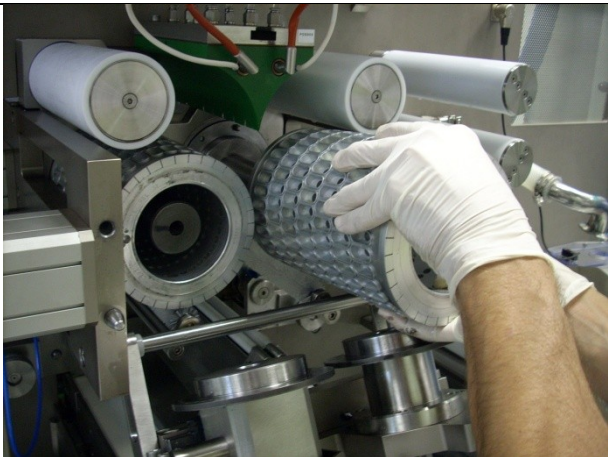
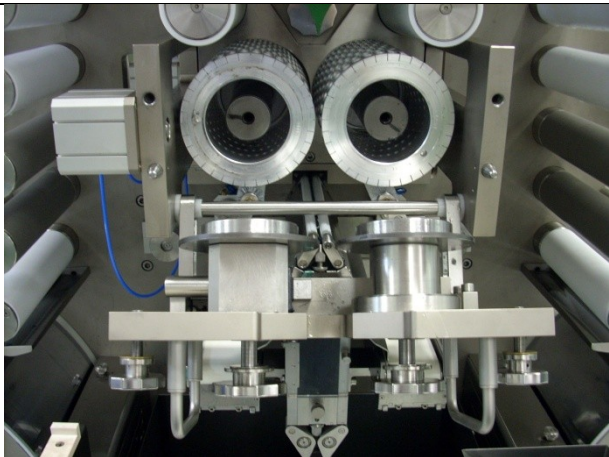
1-Die roll coupling housing on trolley	2-Unlock the the fixing knob
	
3-Slide the housing on the mobile lift	4-Put the mobile lift in position in front of the machine
	

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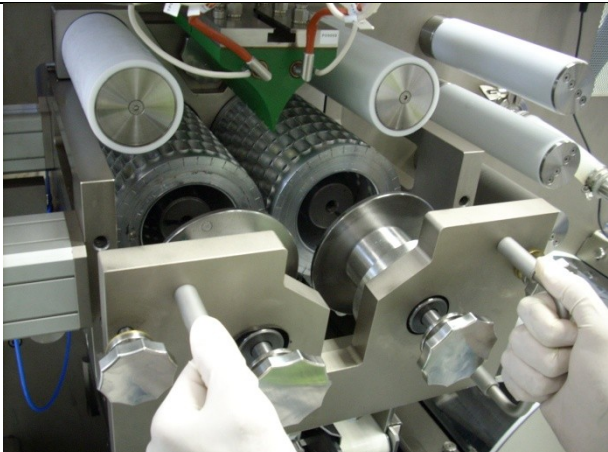
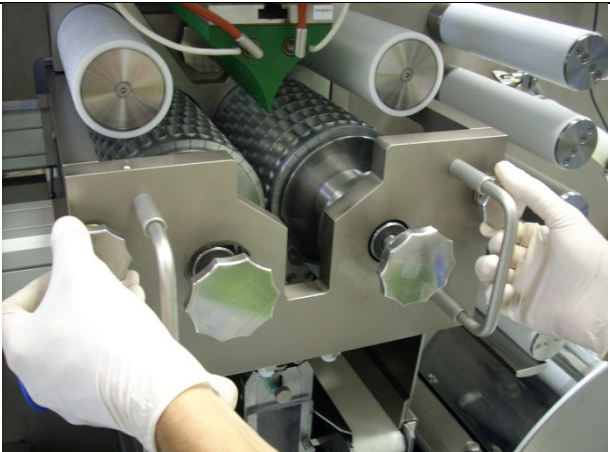
5-Slide it in position	6-Fix the die roll housing with the knob positioned in the middle of the two die rolls.
	

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### 3.6 Die rolls assembly

1-Die rolls on a proper trolley.	
 A photograph showing four cylindrical die rolls with a textured, perforated surface. They are arranged on a stainless steel trolley with a perforated top surface. A green plastic component is also visible on the trolley.	
2-INSERT the right roll and then the left	3-Closed the Yoke
 A close-up photograph showing a person's hand wearing a white glove, inserting a die roll into a machine. The machine has various rollers and components visible.	 A photograph showing the machine with the die rolls installed. The machine has a complex structure with various rollers and components. The die rolls are visible in the center of the machine.

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4-Closed manually the chute conveyor	5-Fix manually the Yoke
	


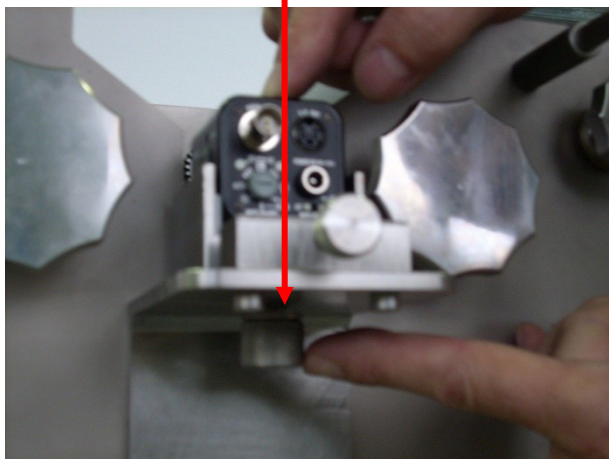
6-Tight the two knobs securing the yoke assembly to the die roll assembly.


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### 3.7 Die rolls alignment

The cavities in the right die roll must be aligned with the cavities in the left one . The machine supplied is already mounted and tested with the correct die roll alignment. In this situation the worker don't need to align the die rolls any further.

To check the alignment, place the telecamera Leica <sup>1</sup>near the die roll housing, put and fix the camera with the knob and proceed to focus on the die rolls front tag ; you will see also the cavities alignment with a proper illumination.

1-Assemble the telecamera support frame	2-Fix the camera with the bottom knob
	

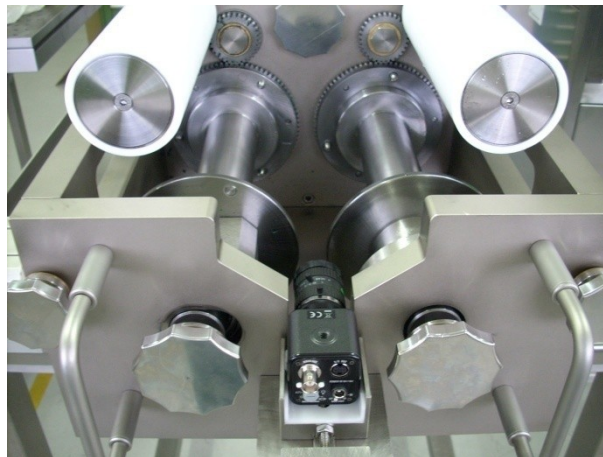
<sup>1</sup> Item available as an option.

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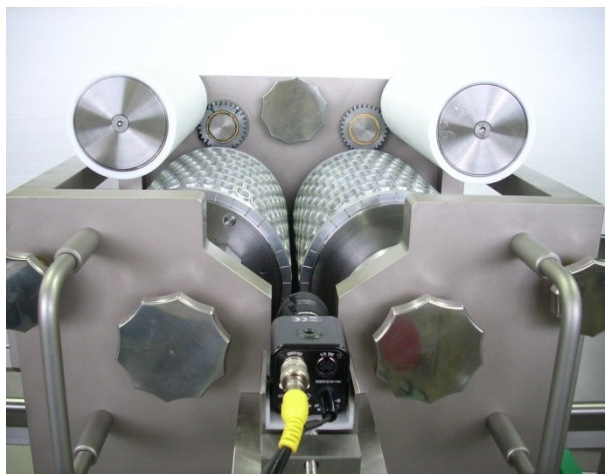
3-Adjust the camera at maximum distance with the rear knob.



4-Correct camera installation



5-Put the die rolls in place , connect the camera wiring and proceed to focus on the die rolls front tag





Please follow instruction of the Telecamera Leica on software and alignment

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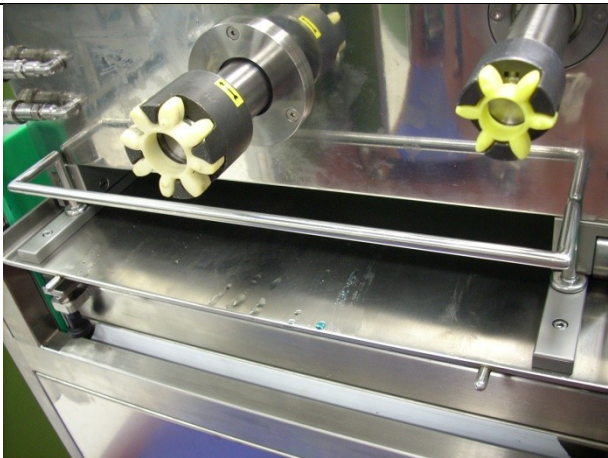
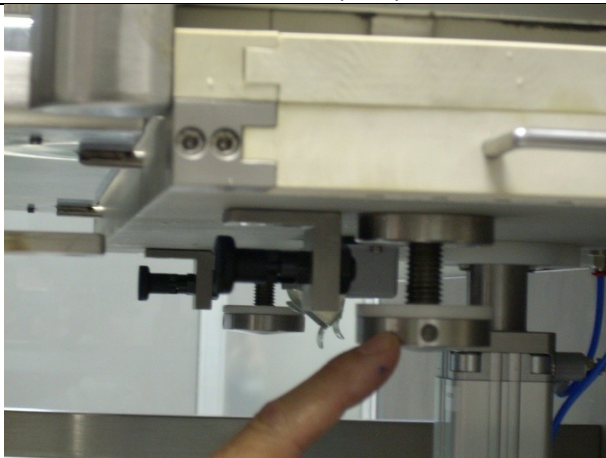
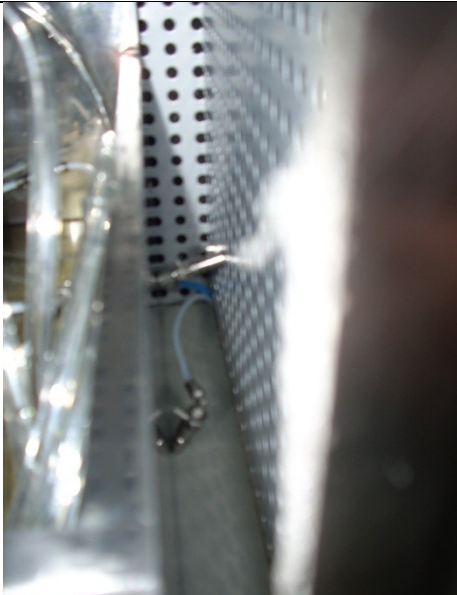
### 3.8 Pump housing assembling on the machine

1-Fill pump on trolley.	2-Slide the fill pump on the mobile lift
	
3-Put the safety	
	

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4-Lift the pump	5-Slide the pump on the encapsulation machine pay attention to the coupling of the two shaft
	

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6-Rear view of the two shaft	7-Screw the two block to fix pump
	
8-Connect the two quick connection.	
	

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10-Insert the fill flexible pipe inside their position and close.

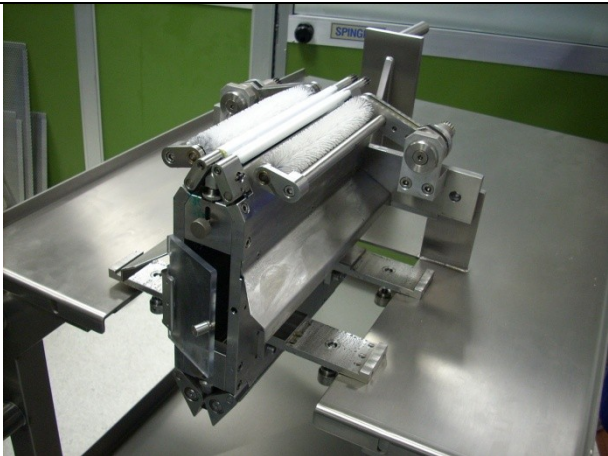
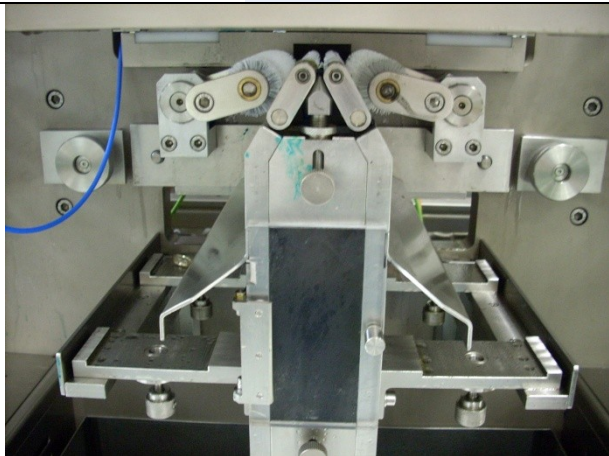

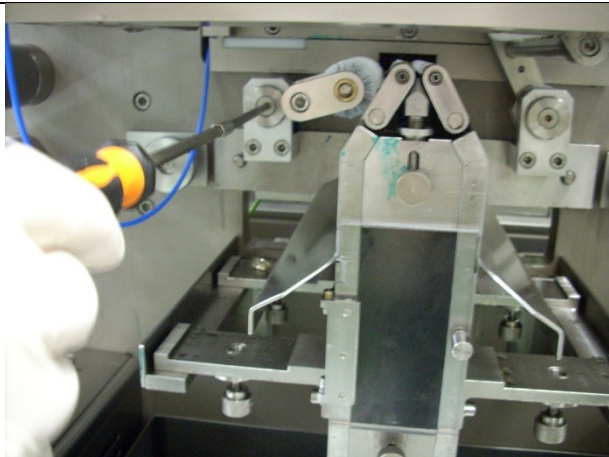
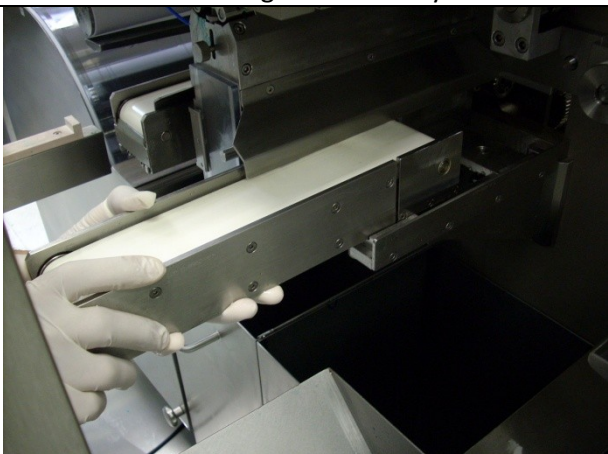
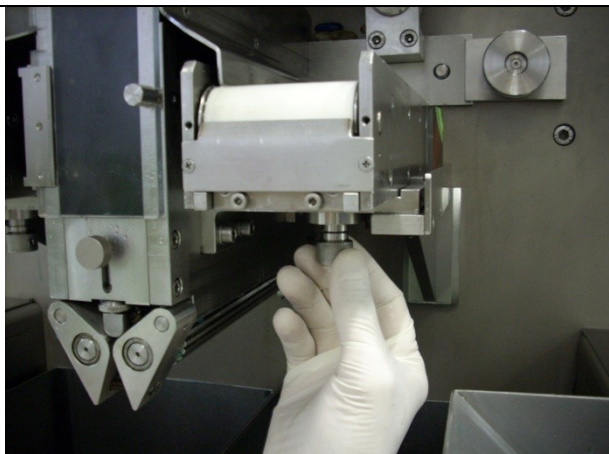


11-Install the level sensor on the top of the hopper.



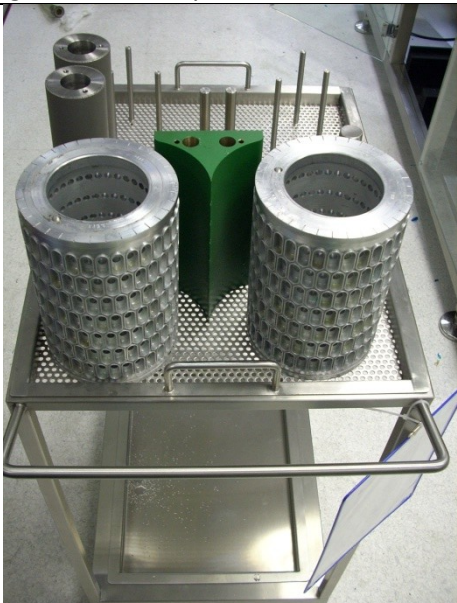
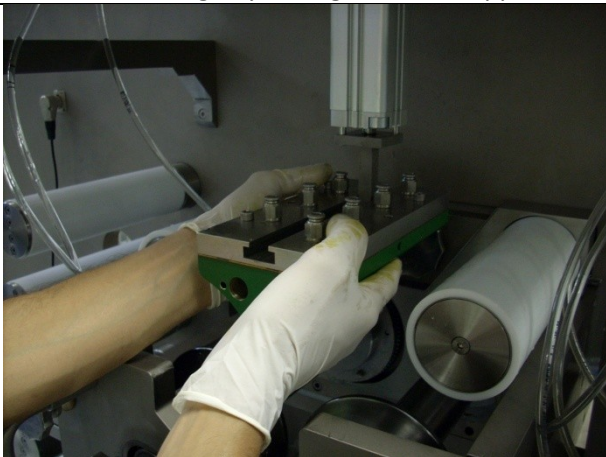
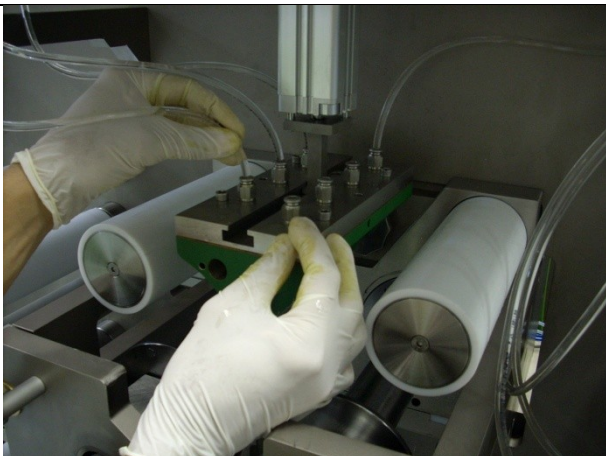

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### 3.9 Chute assembly and mangle roll assembling on the machine

1-Chute assembly on trolley	2-Remove the chute assembly and install it on the correct position below the die roll housing, by sliding it on the two shelves.
	
3-Tight the two knobs	4-Adjust the position of the two brush as shown below
	
5-Insert the left and right belt conveyor	6-Fix them from below
	

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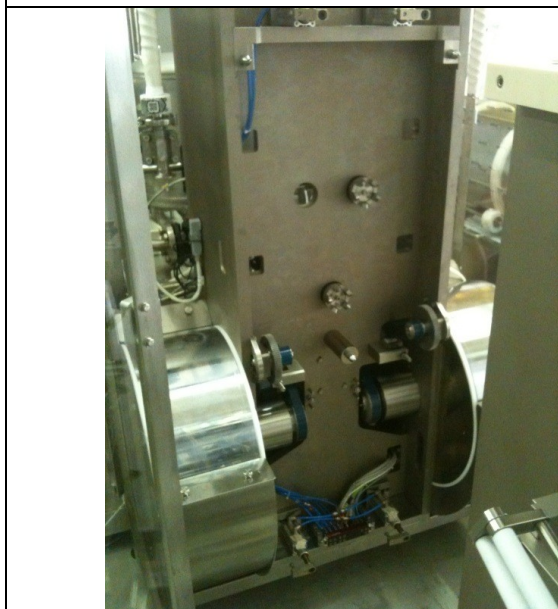
### 3.10 Wedge assembling on the machine

1-Wedge on the trolley	2-Insert the wedge by sliding it on the support
	
3-Plug the fill pipeline.	4-Insert the heating element and the temperature probe.
	

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### 3.11 Frontal part Connection

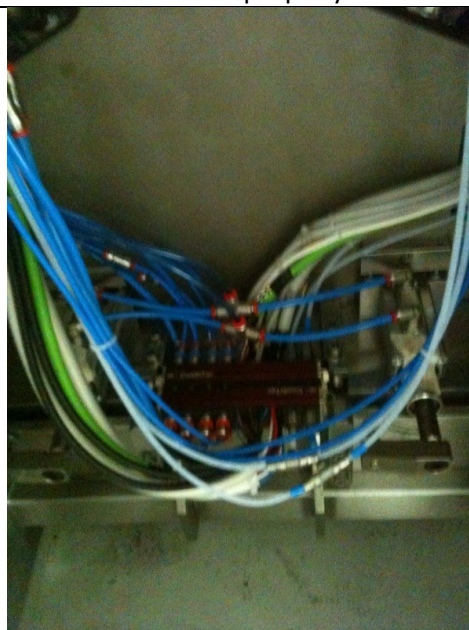
Position the frontal part of the machine in front of the encapsulation machine.



Slide the machine on the top of the rail, until it stop.



Check that the multicontact plug below is installed properly



Now follow the instruction on the GK72 HMI manual, in order to operate on the touch screen and close the machine.

### 3.12 Spreader boxes assembling on the machine

Place the spreader boxes in position over each casting drum. Secure the spreader boxes to the machine frame housing by pivot screws in the pivot brackets.

The spreader box body must rest on the drums.

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Lower the gate completely until it rests on the drums; check that the 0.05-mm thickness gauge do not pass through along the contact line between the box and the drum.



Put the graduated scale, on the adjusting gate, at zero: unscrewing the dowel on the knob and rotating it until it reaches the zero. Then block it.

During the adjustment of the ribbon thickness, the two adjusting studs of each spreader box must be screwed at the same time .



The adjustment must be done rotating each of them:

- clockwise, to increase the thickness
- anticlockwise, to reduce it

Insert the cartridge heaters in the spreader boxes.

1-Spreader box on the proper trolley	2-Install the spreader box and fix it with clamps
	

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3-Insert heating element and probe	4-Install the level sensor from the box
	

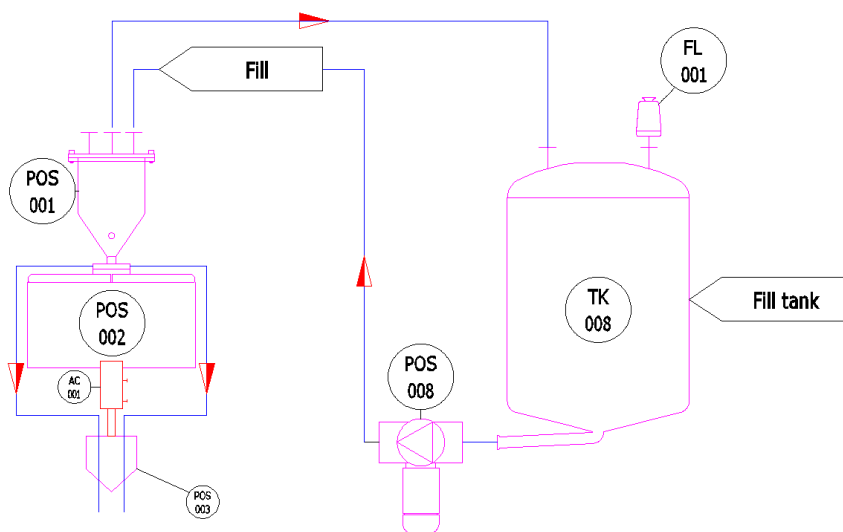
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### 3.13 Fill line setup

The fill can be transferred from the tank to the fill pump, in two different modalities, prepare the fill line according to the schematics below.

#### With recirculation (for paste)

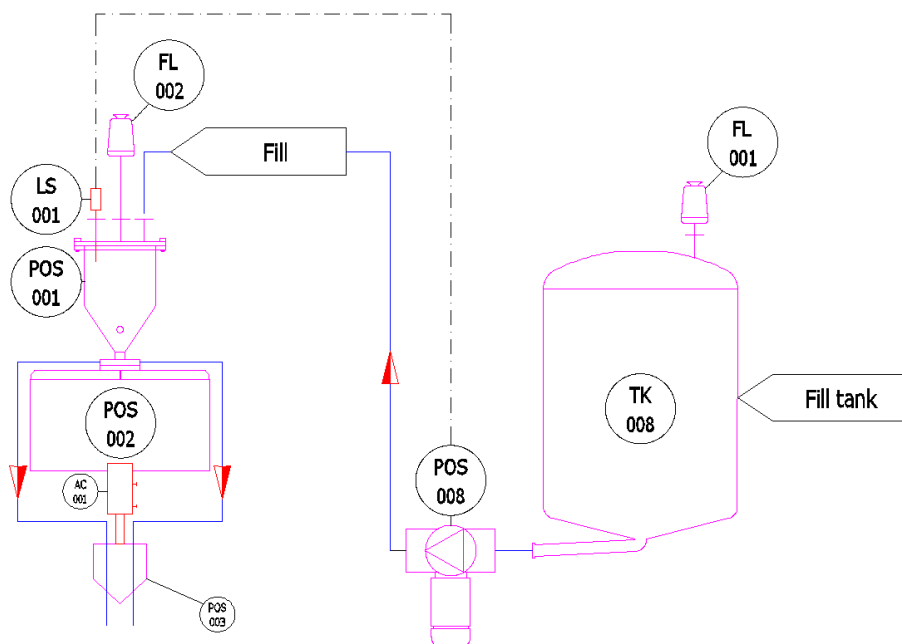
The product is continuously keep in recirculation between the tank (TK001) and the hopper (POS001) installed on the fill pump (POS002), by a transfer pump (POS008); a filter of 0.2  $\mu\text{m}$  (FL001), installed on the top of the tank (TK001), assure the integrity of the product.



#### With level sensor (for oil)

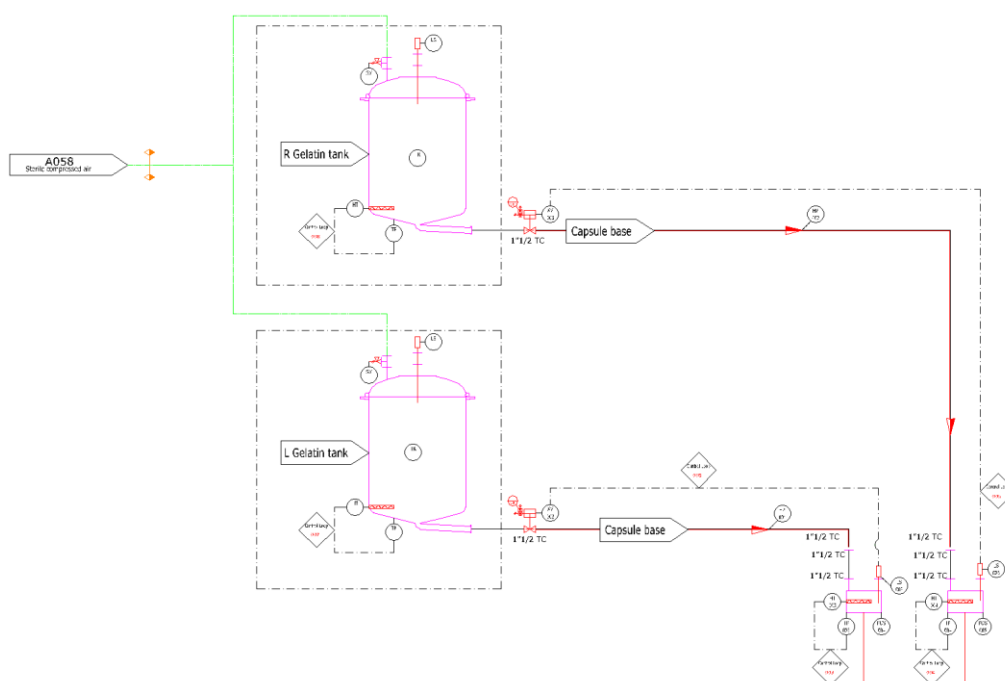
A level sensor (FL001), installed on the hopper (POS001) of the fill pump (POS002), control the transfer pump (on/off) (POS008), in order to maintain a stable level inside the hopper (POS001); in this case two filter (FL001 and FL002) of 0.2  $\mu\text{m}$  installed on the top of the hopper and the tank, guarantees the integrity of the product.

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### 3.14 Gelatine line setup

Connect the pipeline as per diagram below.



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### 3.15 Oil roller lubrication

The encapsulating machine has a gelatine ribbon lubrication system which allows an extremely precise dosage of the lubricant oil. It depends on the type of capsules and on the type of product to encapsulate. Fill the oil roller tanks , located on the right side of control board , through the two different tank gates, using:

- Middle Chain Triglycerides Oil (100%)
- Middle Chain Triglycerides Oil mixed with Lecithin Oil (0.1% of Soya bean oil in Middle Chain Triglycerides Oil)

For the oil filter cleaning see the maintenance section.

Oil level is controlled and visible on HMI ; at minimum level an alarm will turn on the control panel.

The excess oil is guided towards two small tanks aside the machine under the cooling drums

### 3.16 Pump housing lubrication

Fill the Medicine Pump Housing with Middle Chain Triglycerides Oil

A gear pump , installed in the pump housing and speed controlled by panel, feed the pump with lubrication oil: it will pass through and fall in the pump housing .

### 3.17 Synchronizing the machine

The movement of the medicine pump must be synchronised with the die rolls rotation.

The **timing mark on the face of the injection segment** corresponds to the upper edge of the injection holes.

The **timing mark on the die rolls** corresponds to the trailing edge of the cavities.

When the machine is synchronised, the fill will be fully injected immediately before these two lines meet.



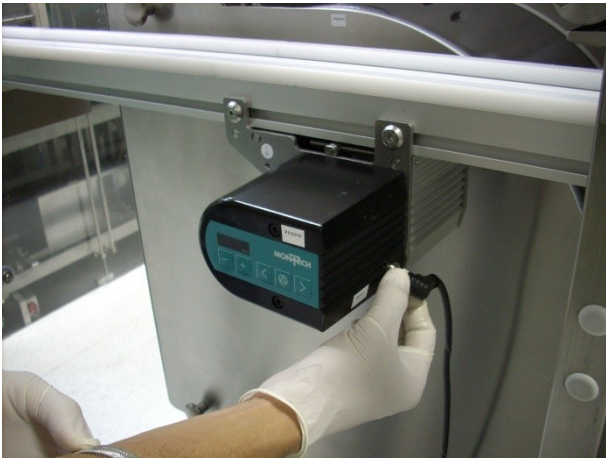

However, tolerance must be made for the thickness of the gelatine ribbon.

Please refer to HMI for pumps homing .

**The machine is now ready for production**

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### 3.18 Capsule conveyor assembling on the machine

1-Conveyor on trolley	2-lift the conveyor and slide it on the machine side to pull it out
	
3-Plug the conveyor motor power cable	4-fix 4 screw at the side of chute discharge lips
	

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#### 5-Conveyor installed



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## 4 Production start

Read HMI user manual before production start to get acquainted to machine functions.

To start the production proceed as follows:

1. Switch on the spreader box cartridge heaters on the control panel and adjust the spreader box opening gates to .030" with the help of the adjusting gauge stud . Allow spreader boxes to heat up.
2. Switch on the Gelatine Pipeline heaters on the control panel and let it heat up for 10 minutes .
3. Connect the gelatine tank conical valve to the Gelatine Pipeline with the silicone tube provided by us. Connect the air feeding , open the valve and, after one minute, switch on the machine.
4. Start to fill the spreader boxes from the control panel by spreader boxes level control.
5. Add one litre of vegetable oil in the medicine hopper. Switch on the cooling fan and adjust the temperature to 15° C and the speed of the air.
6. Start up the machine at 2.5 r.p.m.
7. The gelatin will become ribbon in a couple of minutes.
8. Start the oil rollers lubrication from the control panel and , as the ribbons emerge from the drums, feed them through the oil rollers , die rolls, and mangle rolls.
9. Lower the segment and start the segment heating element at requested setpoint temperature .
10. As soon as the segment reach the desired temperature , put the die rolls in the CUTTING position and immediately operate on the shut-off valve.

### 4.1 Checking the fill

Check the capsules shape, fill weight and shell thickness and make necessary adjustments. The fill weight varies by altering the pump dosing stroke . As soon as satisfactory capsules are produced, drain the vegetable oil from the hopper. Connect the hopper to the main supply by the Cleanline Medicine Pump line. The first few hundred capsules contain a mixture of vegetable oil as fill material, and must be rejected. As soon as production starts, check the capsules fill and shell weights.

Counting from the timing mark, take the first and the last capsules from the dies. Wash them in a beaker full of ether to remove the external traces of lubricant. Weight on the balance and record the weights. Partially dissect the sample capsules at the seam and wash again in order to remove all traces of fill and allow ether to evaporate. Place the shell on the balance and record the net weight. (The difference between the two weights is the true weight of the fill). Repeat these sampling tests as frequently as the precision of the order requests. Then take the capsules from the second and from the last but one cavity of the dies. Take them progressively inwards.

After sampling, make any necessary adjustments to the pump travel and spreader box openings until desired fill and shell weights are obtained. After half an hour, it should not be necessary to make many adjustments to the spreader boxes and pump travel, although adjustments to the cartridge heaters and conditioned air may be required from time to time.

### 4.2 Drying

Newly formed capsules drop from the machine onto a conveyor, which is arranged so that the rejected can be sent in one direction and the perfect capsules in the other.

It is important to see that the conveyor is running to reject capsules at all time during the machine set-up. Capsules that pass the initial inspection reach a tumble dryer for the first stage of drying.

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After being in the tumble dryer for approximately 2 to 3 hours, the capsules are placed on trays. Later, they are transferred in the drying tunnel until they reach the required hardness in approximately 37 to 72 hours. When this process is completed, the capsule are ready for inspection.

### 4.3 Stopping the machine

Stop injection of fill material, switch off the segment heaters, release pressure on the die rolls and raise the pump housing assembly to the idling position.

Switch off the Gelatine Feeding System.

Close the gelatine tank valve.

Switch off the Cleanline Fill Pump.

Keep the pipeline in place for washing cycle.

### 4.4 Tumble dryer programming

The tumble dryer programming is set from the control panel : please refer to chapter 6 to program the baskets work in the proper way .

It is possible to modify charge and discharge time, and rotational speed.

For a proper discharge time program, proceed as follows:

**Maximum discharge time:**

CT = first basket charge time

N = basket number

The stop time during the rotation change is fixed in 12 seconds, so

the basket maximum discharge time MTS will be :

\_\_\_\_\_

Example:

N = 3 baskets

CT = 600 seconds

\_\_\_\_\_

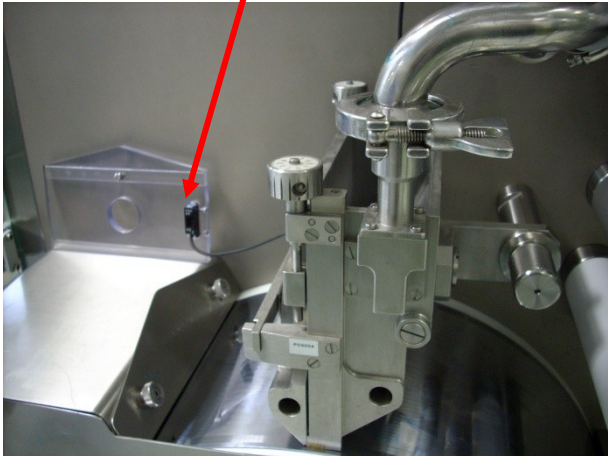
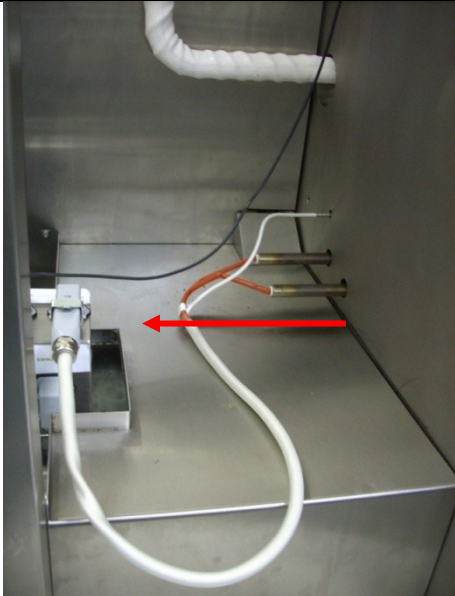
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## 5 Dismantling the equipment and cleaning procedures



### 5.1 Spreader boxes and gelatine pipeline

After each production run, remove the two spreader boxes from the machine (see pictures below) and place them on the appropriate trolley.

Wash the spreader boxes in the washing room by immersion in hot water or in the washing machine; use hot water and rinse with demineralised water. Dry with industrial paper soaked with alcohol.

1-Remove the level sensor from the box	2-Remove the whole heating element and temperature probe wirings
	

**CAUTION :** do not hit the cooling drum while removing the spreader box : the drums can be permanently damaged

3-Unscrew the locking , then remove the spreader box	4-Store the spreader box on the proper trolley and proceed to washing
	


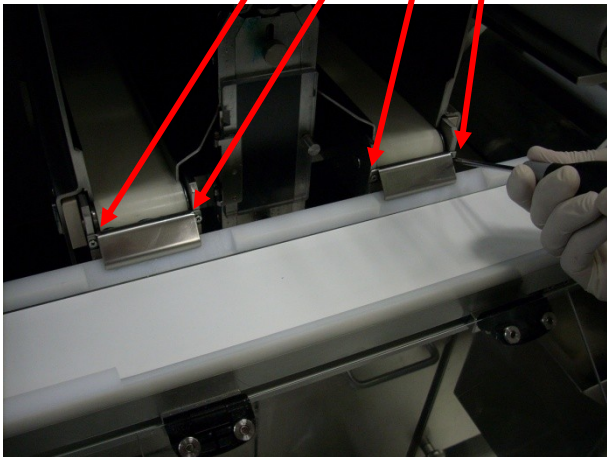
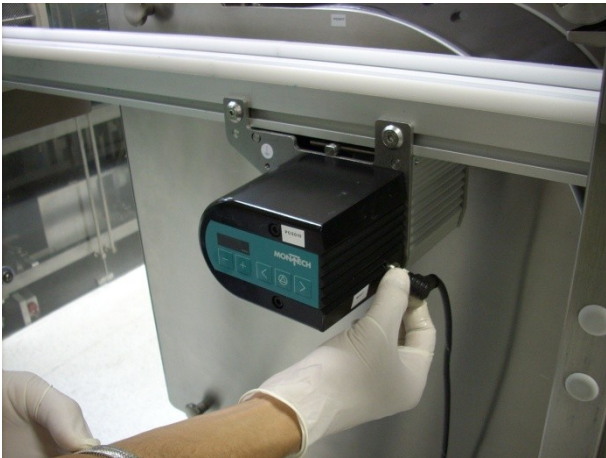

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After the spreader box disassembly it is possible to proceed with the gelatine pipe washing : connect the gelatine piping as shown in photo



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## 5.2 Capsule conveyer

1-Main capsule conveyor lean on machine frame and tumble dryer conveyor	2-Remove 4 screw at the side of chute discharge lips
	
3-unplug the conveyor motor power cable	4- lift the conveyor and slide it on the machine side to pull it out
	

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5- Lay it down on a trolley and remove the capsules



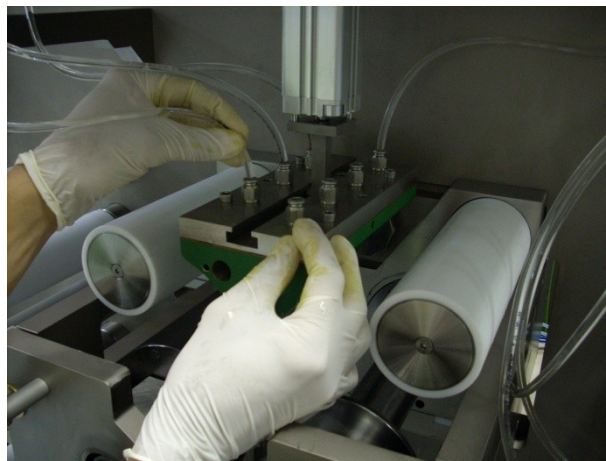
After removing the capsules trapped , wash the residual oil with hot water and 10% Uppercut solution. Rinse with de-mineralised water and dry with industrial paper moistened with alcohol.

### 5.3 Wedge

1- unplug the heating element Remove the heating element and



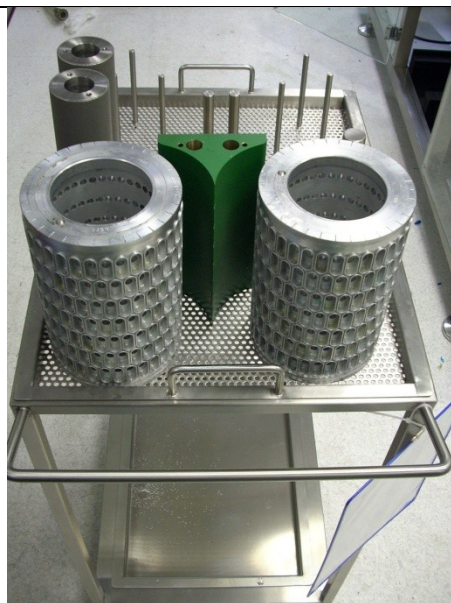
2- Unscrew the nut and remove the flexible pipes



3-Pull the wedge from the seat along its guide

4-Place the wedge on its trolley

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Disassemble the distributor from the wedge


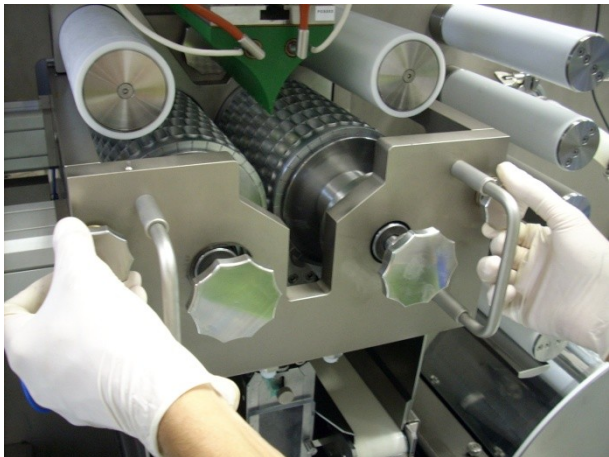

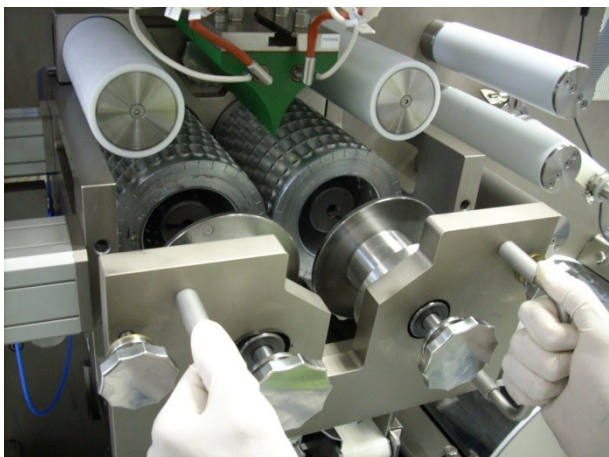
Wash with water and 10% Uppercut solution.

Rinse with de-mineralised water and dry with paper soaked with alcohol.

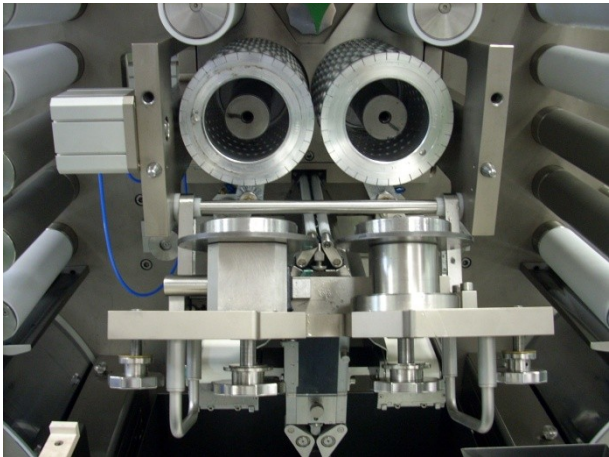
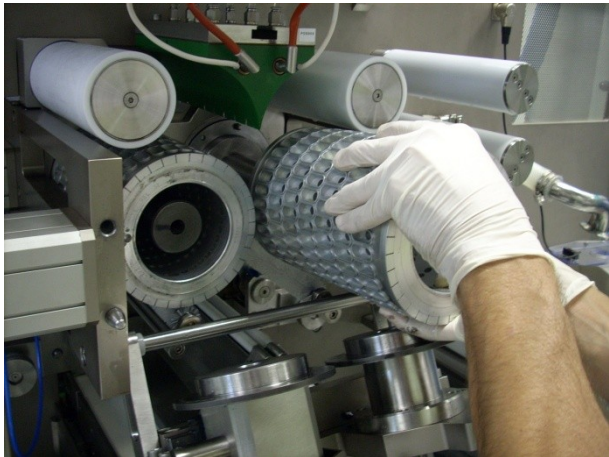
Remove all the gaskets and replace them with new ones for a new production.

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## 5.4 Die-Rolls

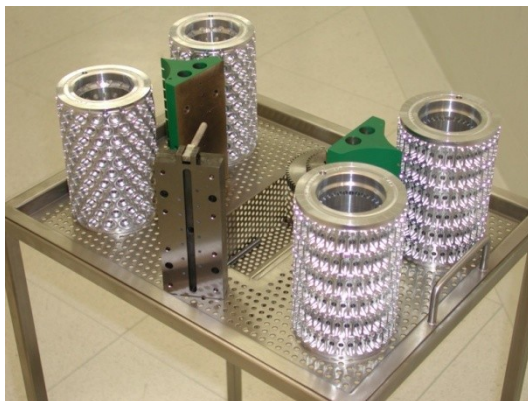
<p>1-Unscrew the two knobs securing the yoke assembly to the die roll assembly, then unscrew the two die shaft knobs securing the two die rolls.</p> 	<p>2-Remove the Yoke Assembly from the seat</p> 
<p>3-Remove the 2 bracket beside the chute conveyor</p> 	<p>4-Pull and push the central knobs to release the die rolls from the yoke ; Pull the die roll yoke and let it slide on its guide</p> 

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5-Yoke released	6-Remove the right roll and then the left
	

Do not bump the dies against metal surface : the die rolls could be permanently damaged and perform badly in ribbon cutting

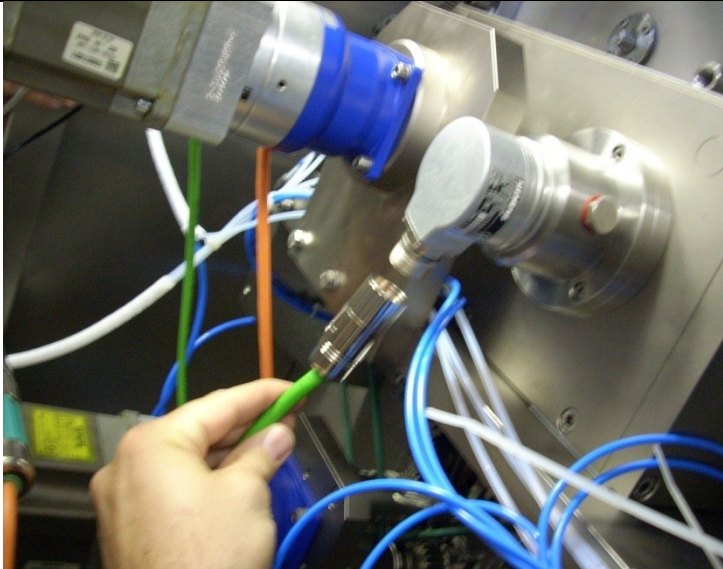



7-Store the die rolls on a proper trolley.




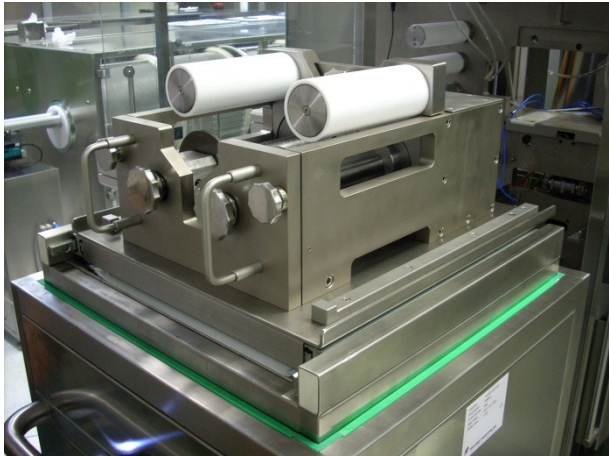
Die rolls are washed with water and 10% UPPERCUT solution or similar  
They are rinsed with water and dried with industrial paper soaked with alcohol.

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## 5.5 Die-Rolls housing


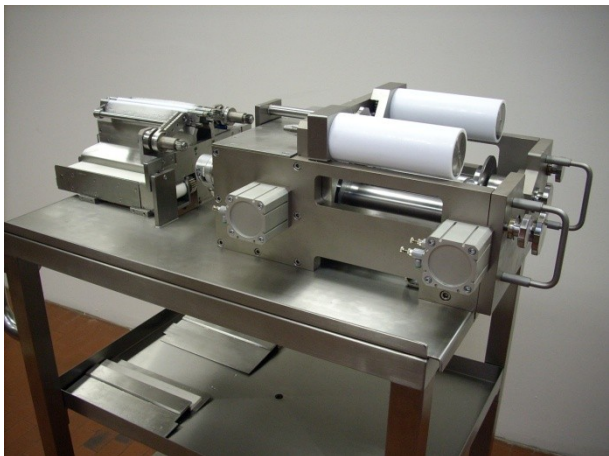
1-unscrew the plug connecting Siemens encoder on the back of the die roll housing	2-Unplug compressed air from the front and back pneumatic cylinders
	
3-Put the mobile service lift in front of the machine and lift at die roll housing height ; push the tray until it fits in the guides on the machine frame	4-Lock the tray with pin , now you can pull the die roll housing on the tray
	

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5-pull the housing until lays completely on the tray	6-Unlock the tray and pull it until you can lock it again in place
	

7-Move the tray to the lower position , housing is ready to be transferred to trolley	8-Put the mobile service lift in front of the trolley for housing, move the tray for connection , then move the housing on trolley
	

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9-Lock the housing on trolley with the proper fixing knob	10-Dieroll housing stored on trolley
	

### Washing Procedure

Follow this procedure in order to wash the die roll housing:

- Suck by vacuum all the residual
  - Pour hot water and detergent (water and 10% Uppercut solution) from the top of the die roll housing
  - Run slowly the machine at minimum speed for 5 minutes
  - Stop and suck all the dirty water .
  - Rinse accurately with hot de-mineralised water and again run at minimum speed
  - Rinse with alcohol to remove all the water residual. Dry with industrial paper soaked with alcohol
- be sure not to leave paper residual inside the die roll housing
- Spray some oil on the gears and the shafts of the die roll housing

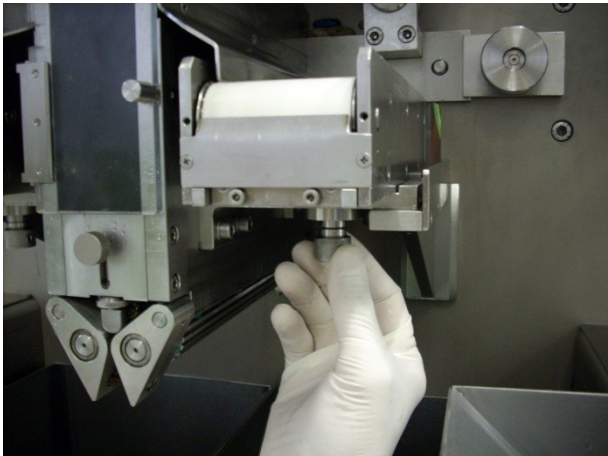
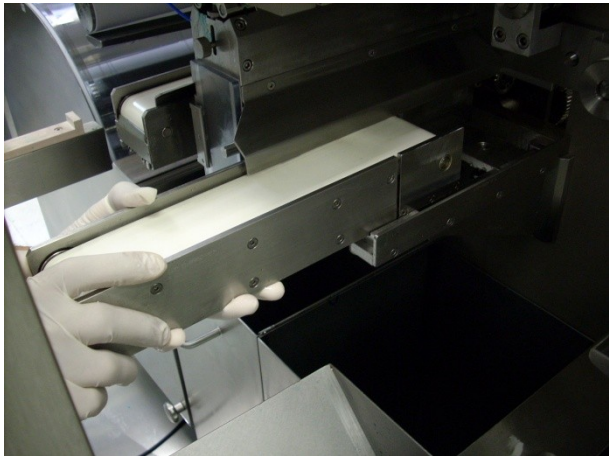
While washing the die roll housing, check accurately the movement of the coupling shaft

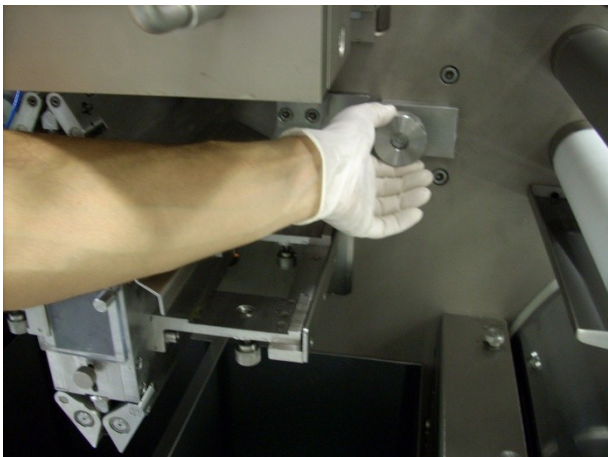
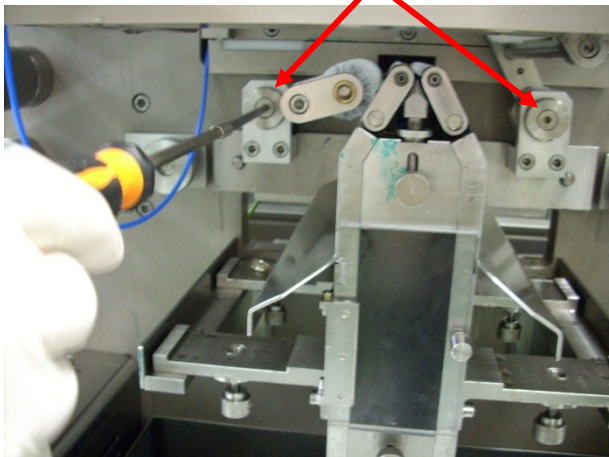
Clean accurately the coupling frame front flange, the coupling flange and the coupling slider .

Clean also the die shaft sliding block

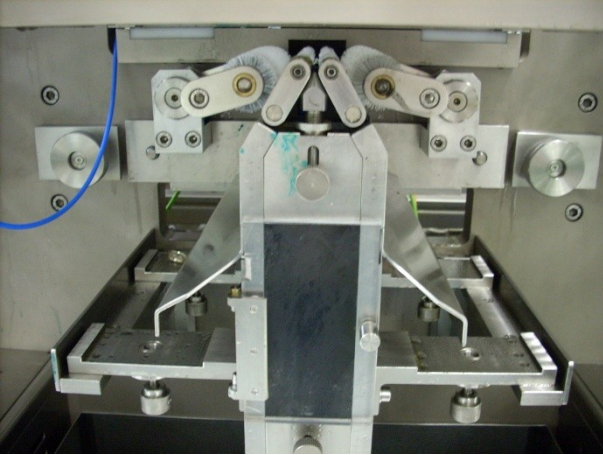
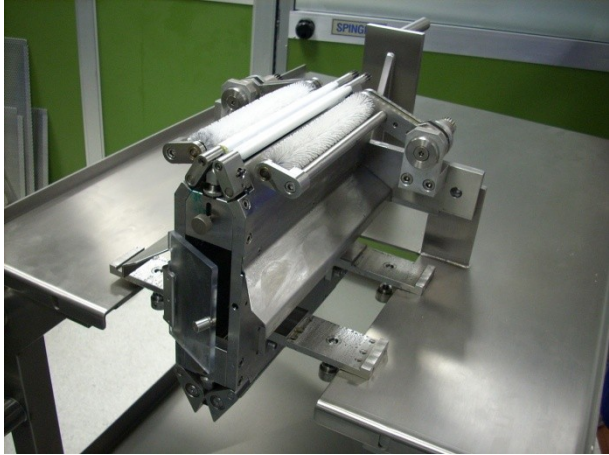
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## 5.6 Chute assembly and mangle rolls

1-Unfasten the pin under the chute conveyor	2-Pull the conveyor along its seat to remove
	

3-Unfasten the knob at the far side to release the chute and mangle roll assembly	4-Unscrew as in picture to put the brushes in safe position
	

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5-Assembly is ready to be removed	6-Store on the proper trolley ; disassemble to clean
	

The Chute Assembly is removed from the machine and partially disassembled.

Completely dismount the conveyor belt and the capsule chute

All the parts are washed with 10% Uppercute solution in hot water. After rinsing with demineralised water, they are dried with industrial paper soaked with alcohol.

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## 5.7 Medicine Pump housing disassembly

1-Unlock the clamp and remove the fill level sensor



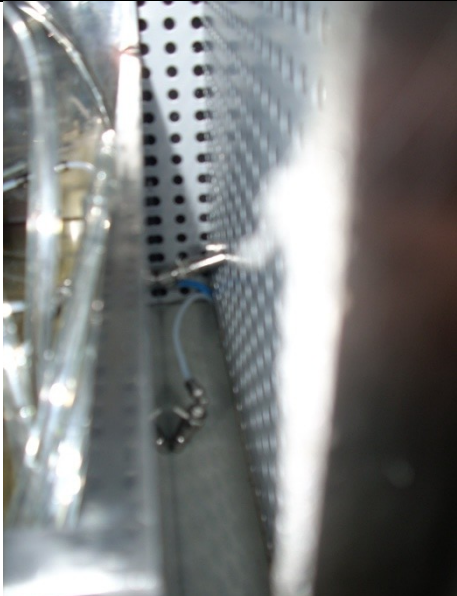

2-Remove completely the flexible pipes fastening guide pulling the handle


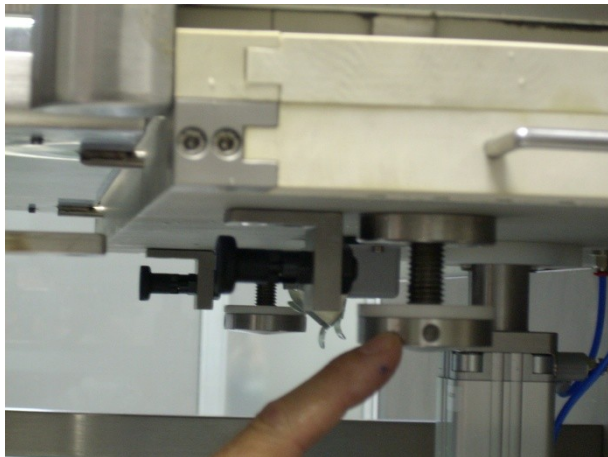


3-Fastening guide removed ; put the flexible pipes in the pump housing , be careful with oil spraying

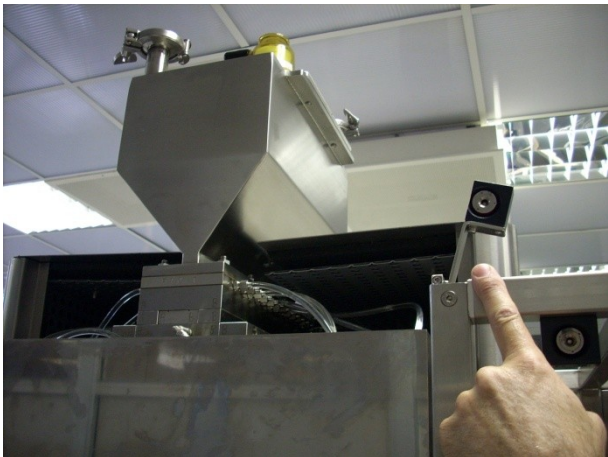




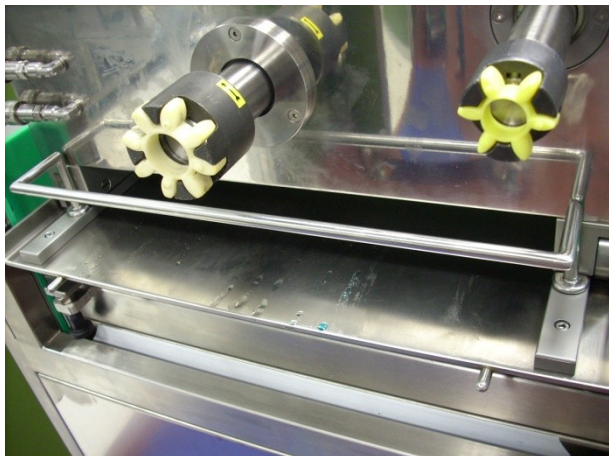
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4- Unplug the fill pump lubrication pipes on the right side.	5- Put the mobile service lift in front of the pump housing, lift at correct height ,push the tray until it locks in front of the pump housing base
	



6-Lock the tray with the pump housing base	7-Unscrew the two knobs under the pump base to release the pump free
	

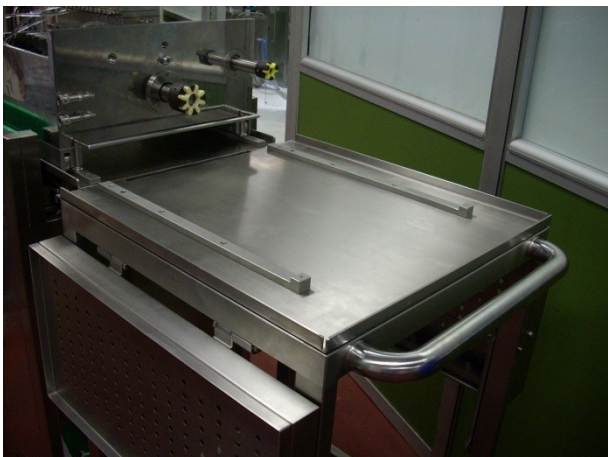
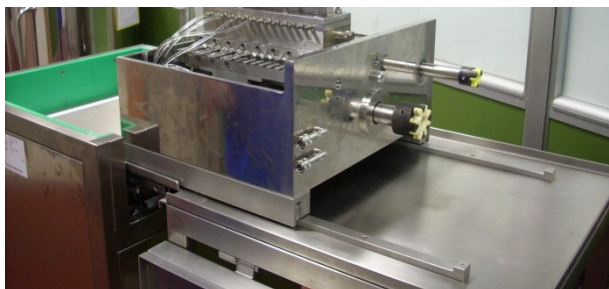
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8-Lift the upper pump block	9-Pull the pump housing on the mobile service lift tray
	

10-Put the safety bracket in place on the back of medicine pump housing , then pull the tray onto the mobile service lift and	11-Safety bracket in place on the back of the medicine pump housing
	

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12-Medicine pump housing on mobile service lift	13-Lift down the medicine pump housing until low position
	

14-Put the mobile service lift in front of the trolley for medicine pump housing and lock them on place ; then remove the safety bracket	15-Transfer the medicine pump housing onto the trolley
	

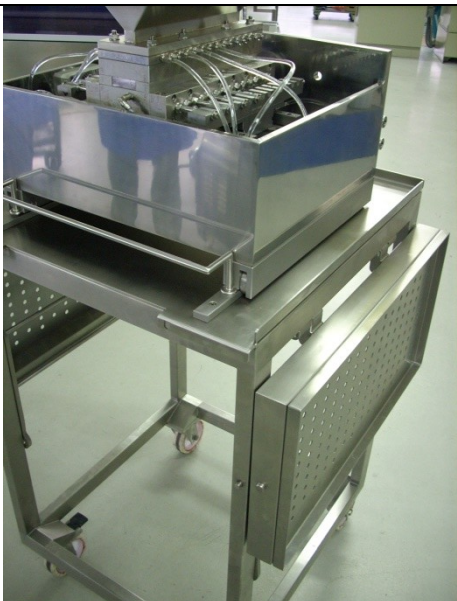

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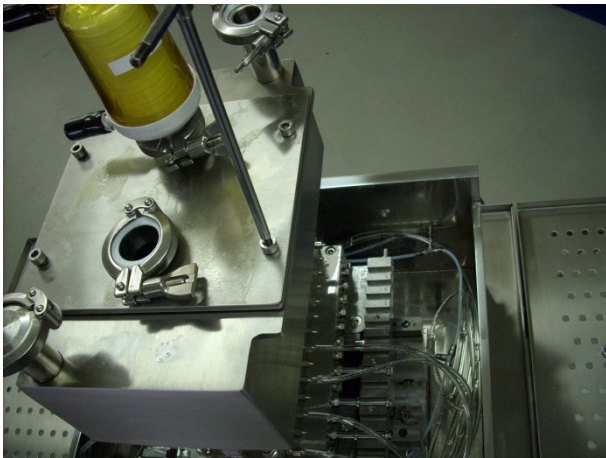

16-Lock the medicine pump housing on the trolley with the same safety bracket



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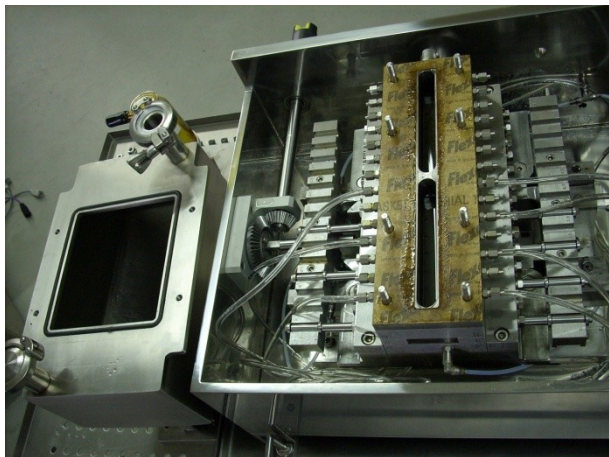
## 5.8 Medicine pump disassembly

1-Medicine pump on trolley ready for dismantle	2-Open the trolley wing , leave the safety bracket in place
 A stainless steel medicine pump unit is mounted on a four-wheeled trolley. The pump has several clear plastic tubes connected to it. The trolley has a perforated metal side panel.	 The trolley's side panel (wing) is open, revealing the internal structure and the pump unit. The safety bracket is visible, holding the wing in place.

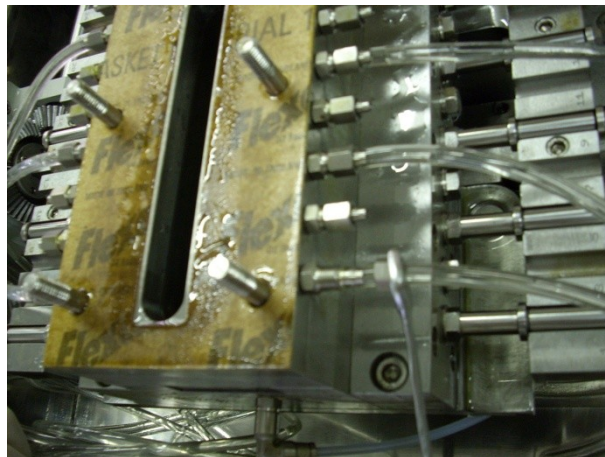
3-Remove the hopper cover	4-Remove 8 nuts and the hopper
 A close-up view of the pump unit with the hopper cover removed. A yellow cylindrical component is visible on the left side of the pump.	 A close-up view of the pump unit with the hopper removed. The internal components, including the pump mechanism and clear plastic tubes, are visible.

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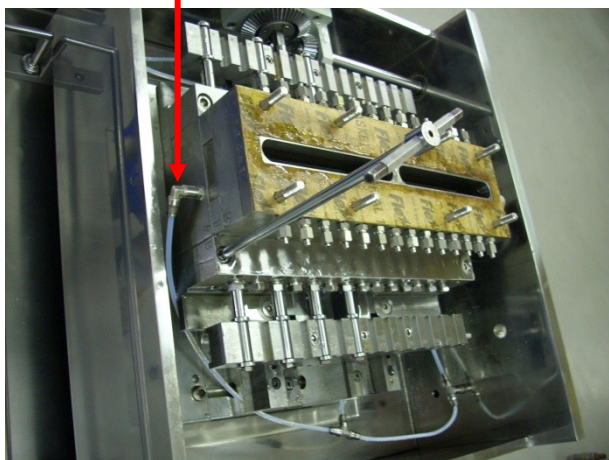
5-Use the trolley wings to manage the dismantled pieces



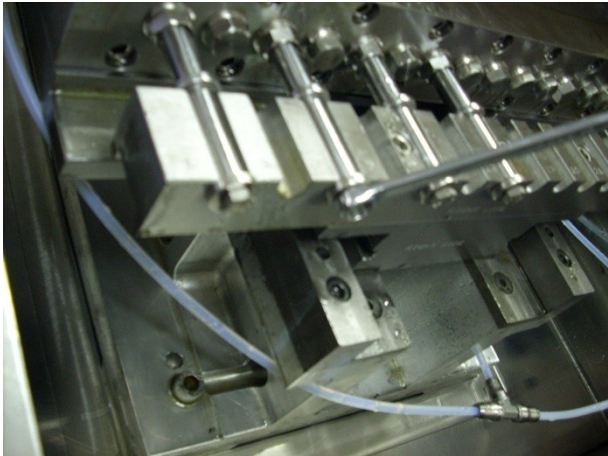
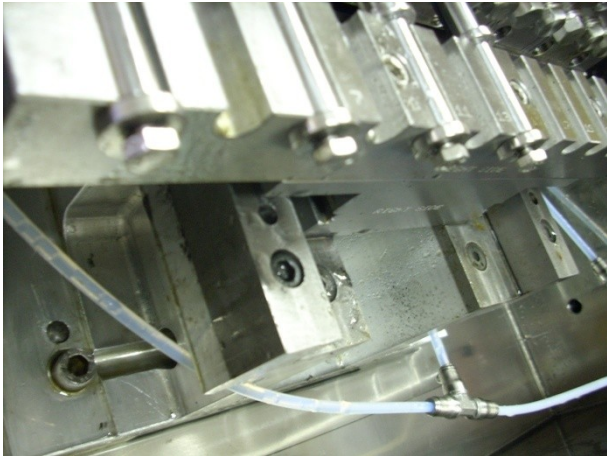
6-Unscrew the nuts and then remove the medicine flexible pipes

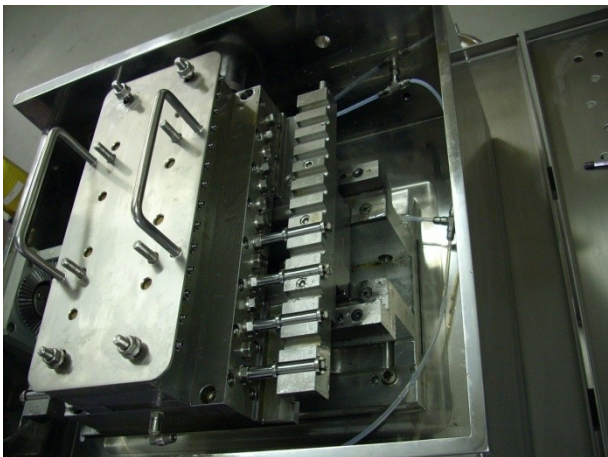



7-Remove the four screws to dismantle the assembly ; remove also the fill pump lubrication pipe

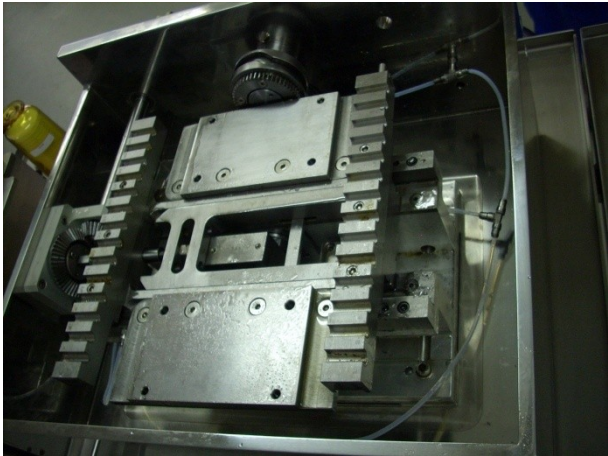
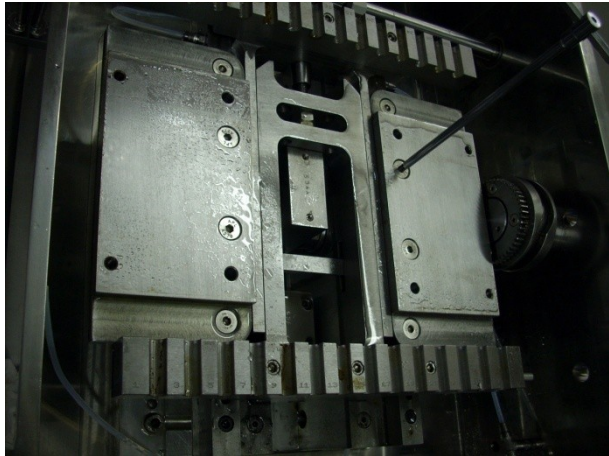



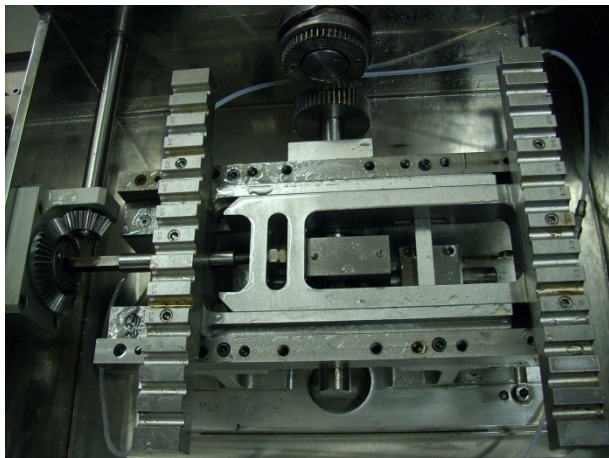
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8-Unfasten all the plunger retaining nut	9-Plunger free from frame
	

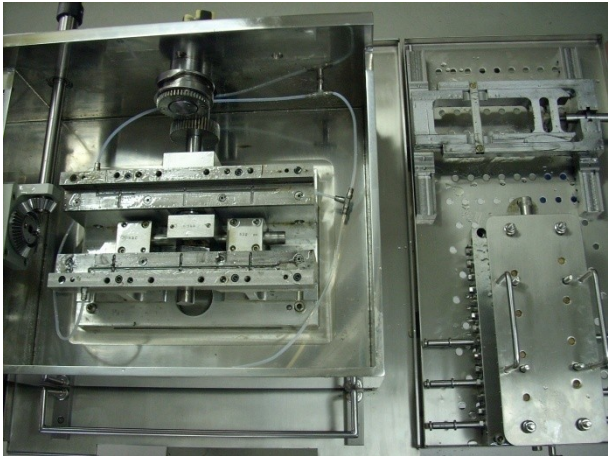
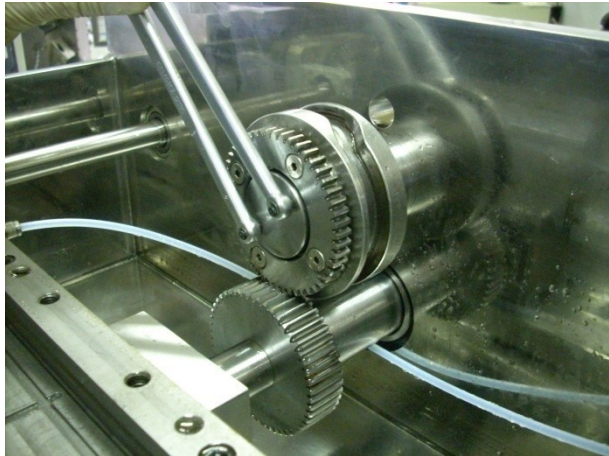
10-Remove the medicine pump from the housing	11-Dismantled medicine pump on trolley wing
	

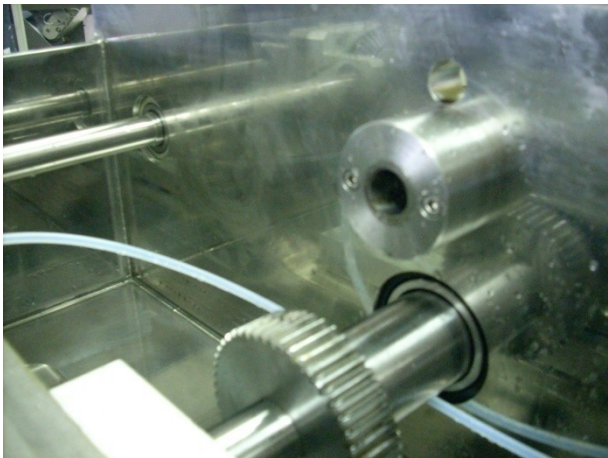
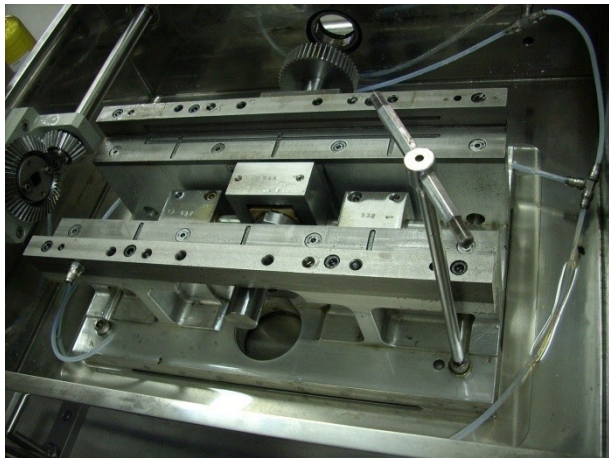
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12-Medicine pump without pump block	13-Remove the 4 screws and remove the two plates
	

14-Remove the plates and store them on trolley wings	15-Remove the 6 screws to pull out the inner yoke bracket
	

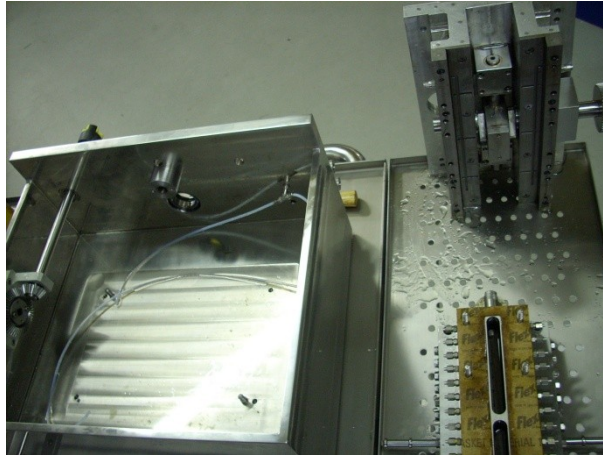
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16-Inner yoke bracket removed and placed on trolley wing	17-Dismantle the cam with a compass key
	

18-Cam dismantled	19-Remove the four screws holding the pump housing
	

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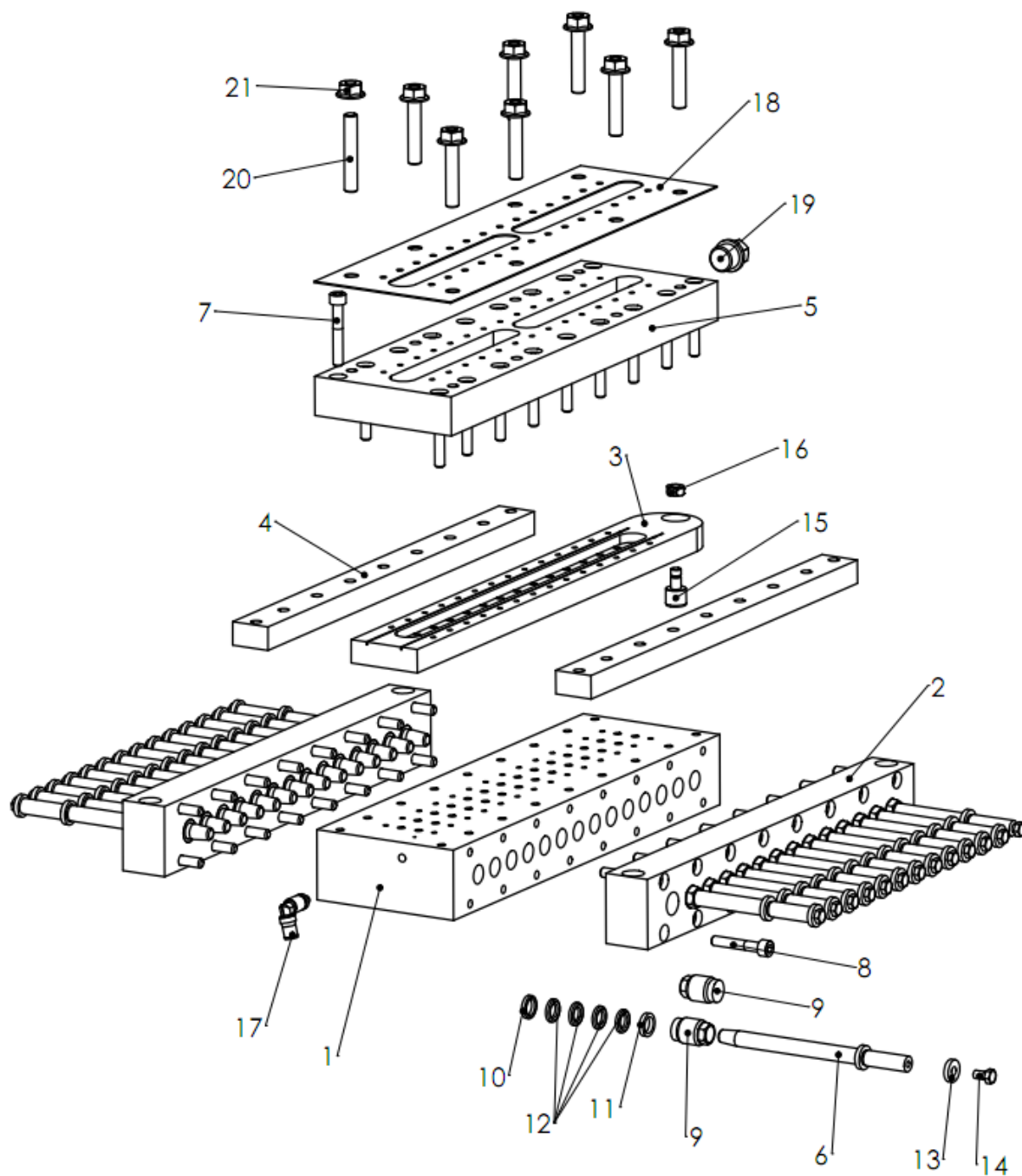
20-Pump housing completely dismantled and ready for washing





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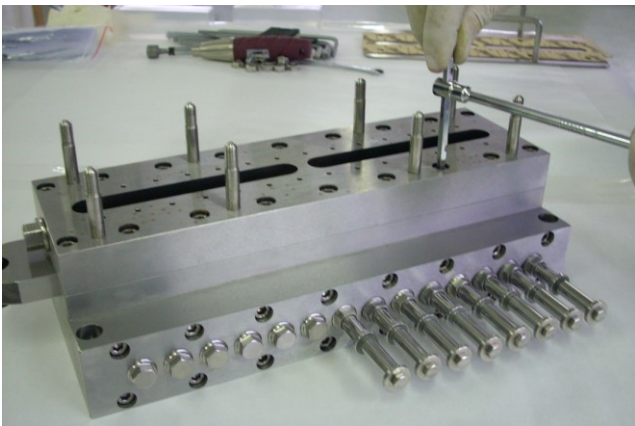
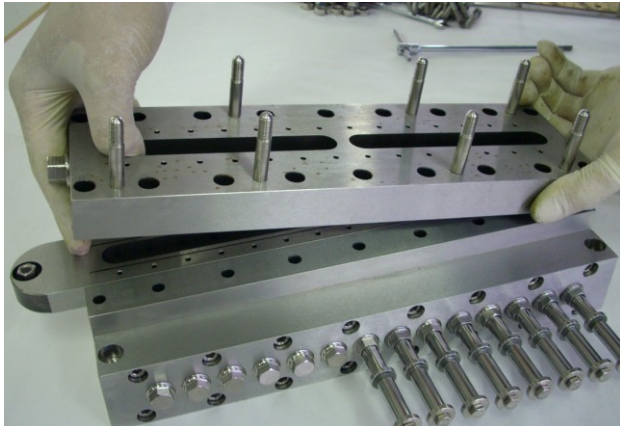
## 5.9 Medicine pump block disassembly

Refer to the following scheme in order to proceed with disassembling action :

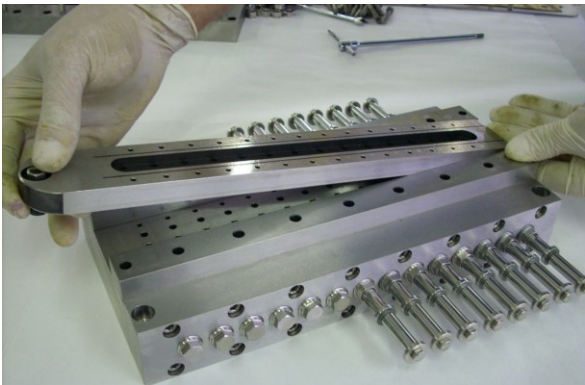
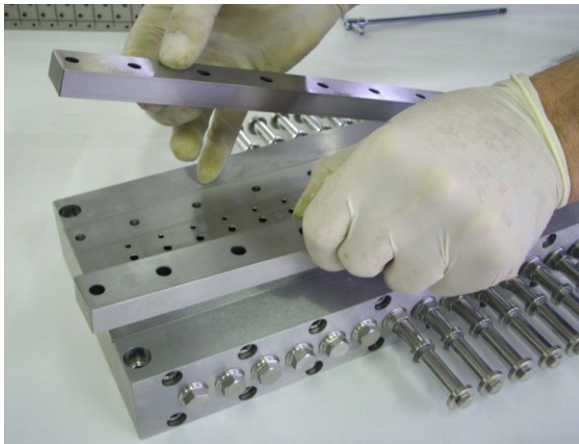


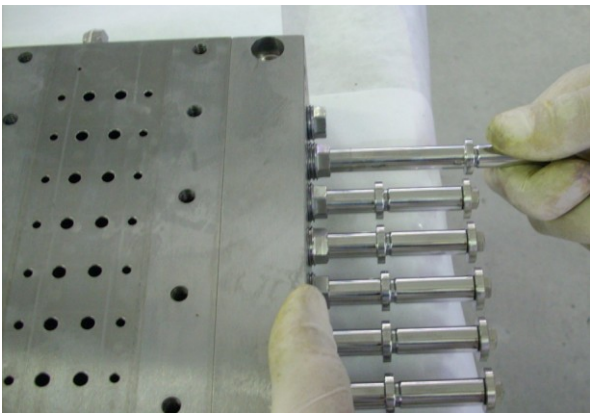
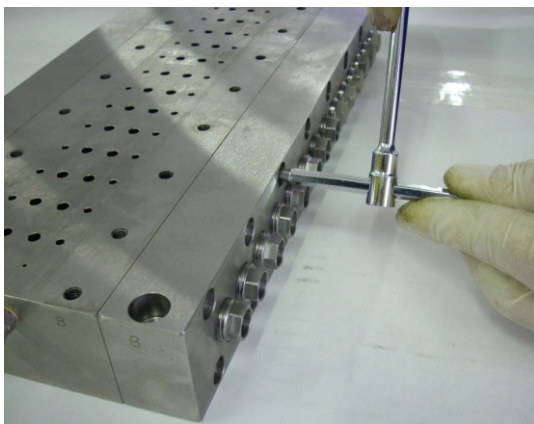
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1-Move the block pump to a clean table with appropriate tools	2-Remove the TOP PLATE gasket
	

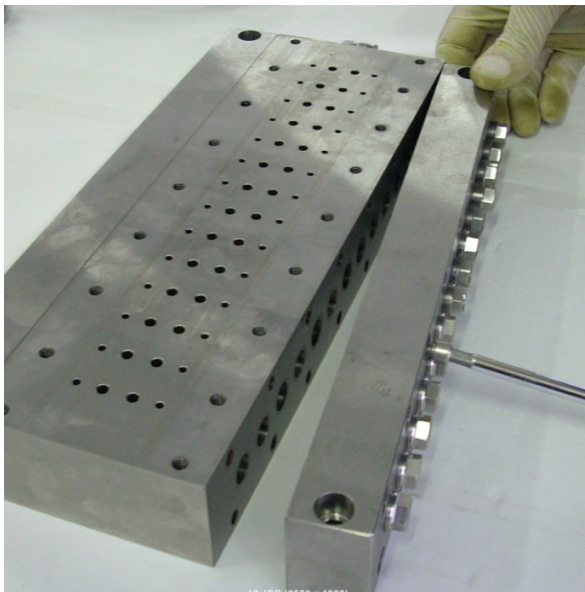
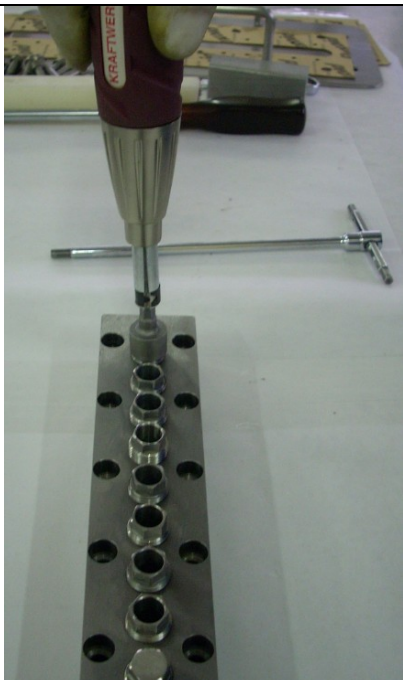
3-Unscrew TOP PLATE trough M6 x 40 screw	4- Remove TOP PLATE
	

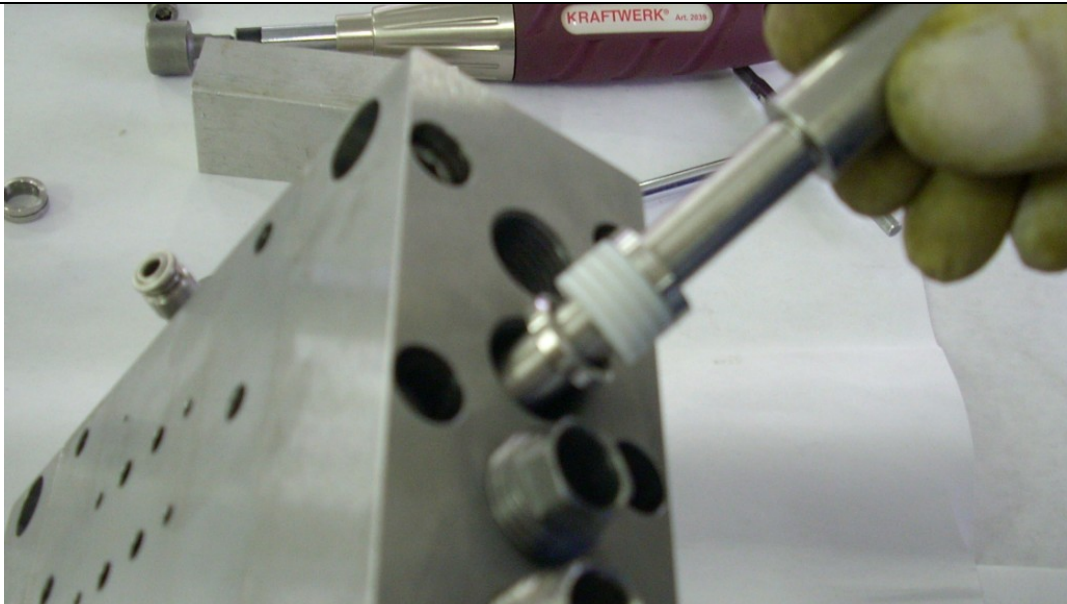
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5- Remove SLIDE VALVE	6- Remove SIDE PLATE
	

7- Remove PLUNGERS	8- Unscrew BANKS trough SOCKET HEAD SCREW
	

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9- Remove BANKS	10- Remove GLAND NUT
	

11- Remove INSIDE & OUTSIDE WASHER , PLUNGER SEAL


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## 5.10 Oil roller

The Oil roller lubrication system needs to be cleaned if the ribbon lubrication is not uniform. This is carried out in three stages:

- Tank cleaning
- Pump cleaning
- Special filter MTP

### **Tank cleaning**

Remove the cover from the mygliol oil tank situated on the rear of machine.

Clean with water and Uppercut 50-50 solution, blow with compressed air and rinse with alcohol.

### **Tank filters cleaning**

Check and clean the filters on the lubrication tank outlet

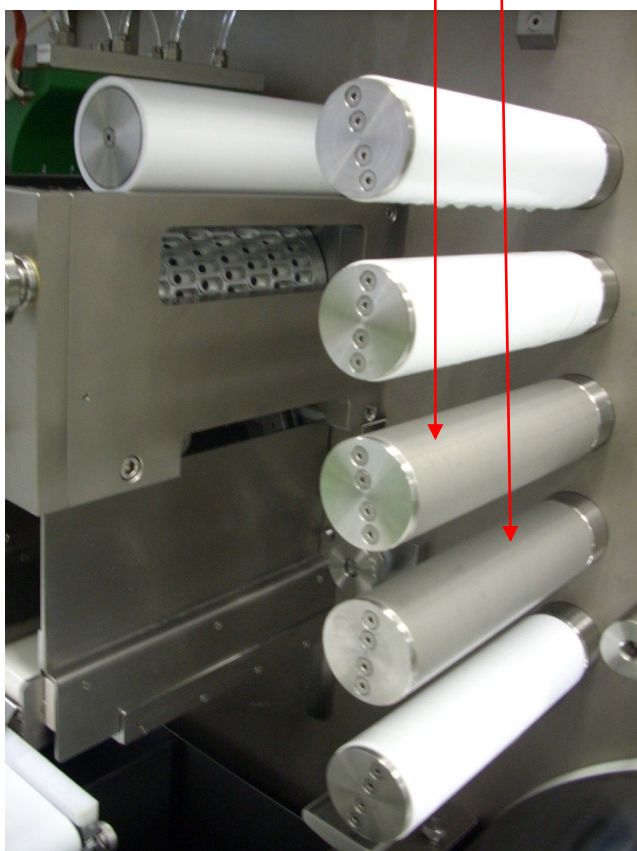
### **Pipeline cleaning**

Disconnect the PVC tubes and blow compressed air (not higher than 3 bar) toward the oil roller.



### **Special filter MTP**

Blow compressed air (not higher than 3 bar) toward the PVC tubes in the Special filter. Inject alcohol through the PVC tubes in the Special filter MTP and blow with compressed air.

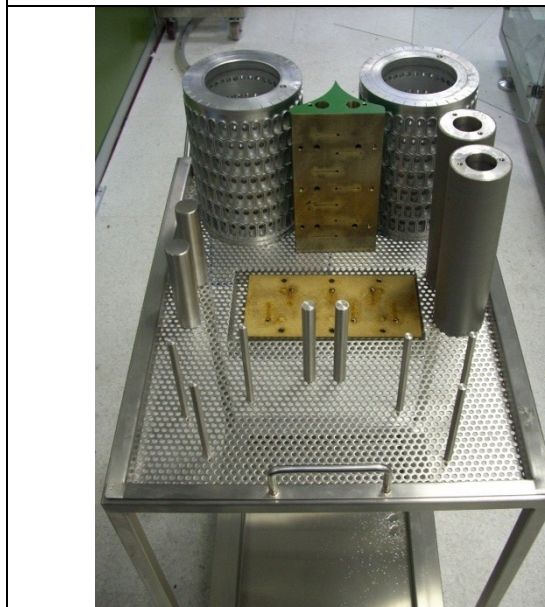
Oil Roller – Special filters MTP



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1-Remove the plate in front of on the MTP filter	2-Pull the filter out of the support
	


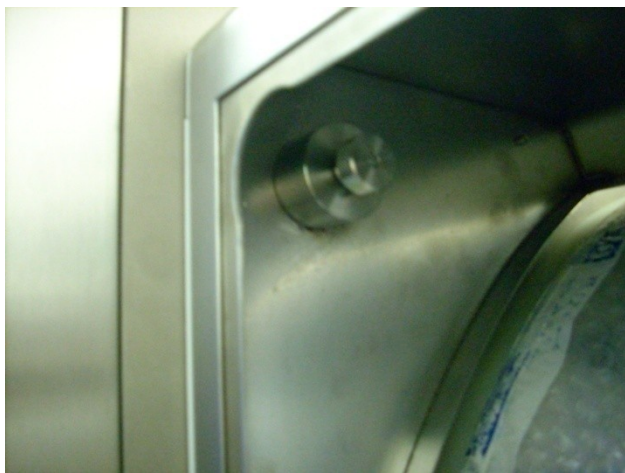
3-Store the filters on the proper trolley , ready for washing





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## 5.11 Casting drums

1-Remove manually the knobs to remove the carter	2-Pull out with the sucker tools the carter
	

3-Open the lateral door	4-Unlock the knob
	

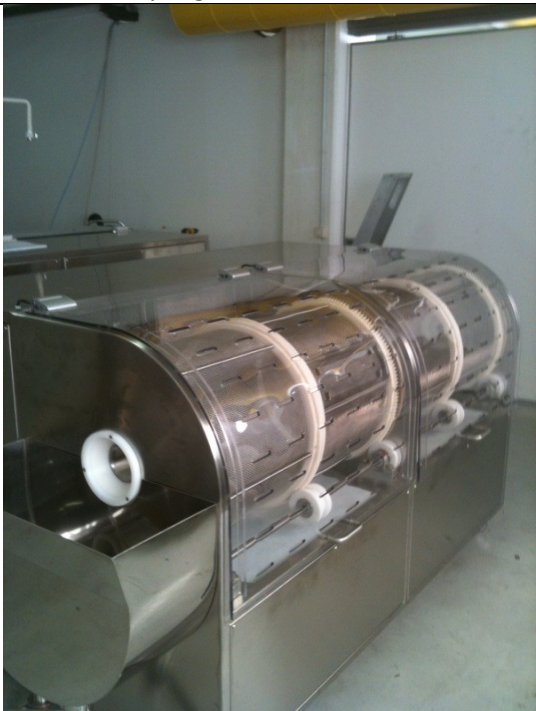



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5- slide the cover	6-clean the drums
	

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## 6 Tumble dryer cleaning and disassembly

Each section can be disassembled independently please follow the photographic procedure to disassemble the tumble dryer.

1-Tumble Dryer general view	2-Open the frontal cover
	
3-Remove the two mini basket	
	

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4-Unscrew and rotate the filter holder	5-Remove the filter
	
6-Unscrew the back panel	7-Remove the back panel
	

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#### 8-Fan plenum view rear view



#### 9-First basket conveyor details



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## 7 Tumble dryer cleaning

The baskets are removed from the tumble dryer and carried on a special trolley to the equipment washing room, where the operator removes the remaining capsules and then starts to clean. The baskets are cleaned with water at 60° C and then washed with 10% Uppercut solution. After that, they are rinsed with de-mineralised water and dried with industrial paper soaked with alcohol.

## 8 Utilities and cleaning media

### 8.1.1 Manual cleaning solution

- Uppercut 10 % solution
- Puligen
- D-Solo
- Ethilic alcohol
- Industrial paper (conforms to law for product in contact with food)

### 8.1.2 Automatic cleaning solution

- Diverflow VC26
- Diverflow VC2

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## UPPERCUT

### Description:

Ecological degreasing soluble in water. It doesn't contain phosphates.

### Purpose and use

Uppercut, thanks to the special agent DRK-55 also penetrates through the fat substances breaking up the more difficult dirt. Fat and residues will easily be removed with a simple throw of water.

Uniting the degreasing power to the environmental safety (it can be in fact also used for cleanings inside establishments in the food industry), UPPERCUT is one of the most versatile and effective available detergents on the market today.

### Component:

alkaline silicate, polypropylene- glycol-ethers, non ionic surface-actives, water.

### Chemical physical property:

Aspect: liquid

Colour: pink

Odour: unscented

pH: 12,9

Boiling point: around 100°C

Point of inflammability: not inflammable

Relative density: 1,05

Solubility in water: complete

### Biodegradability:

The contained surface- actives in the product are biodegradable in superior measure to 90%. To use according to the good working practices avoiding to disperse the product in the environment.

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## **PULYGEN**

Product for the daily cleaning of mechanical parts, stainless steel, tiles, washable walls and crystals, cleanser for hard surfaces.

Composition: it mixes the synergy of non ionic surface-active emulsifying agents.

Exempted by foam, it is not corrosive and it doesn't absolutely irritate the skin.

Biodegradability: 90%. It doesn't contain phosphorus.

Aspect: liquid clear of yellow colour.

Dosing: pour the product on the surface to clean, passing a rag or wet sponge; it isn't necessary to rinse.

## **D SOLO**

Description: alkaline detergent with strong binding action for recycle washings.

Physical state: liquid clear colourless unscented

pH(sol 1%): 12,7

Alkalinity: Na<sub>2</sub>O: 17% NaOH: 22%

Specific weight at 15°C: 1,27

Middle life: 12 months

Biodegradability: 90%

Contained in P: exempt

Method of titration: collect – 10ml,

titrant - HCl 0,25 Ns,

indicator - metilorange,

conc. % = 0,5 \* ml consumed HCl

Concentration of use: 1%-5% in water to 55°C.

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## 9 Maintenance

**ALL THE MAINTENANCE OPERATIONS MUST BE DONE IN SAFE CONDITIONS , AT ATMOSPHERIC PRESSURE AND WITH THE MAIN POWER SHUT OFF.**

**DURING THE MAINTENANCE OPERATIONS THE WORKERS MUST COMPLY WITH THE ACCIDENT PREVENTION RULES IN ORDER TO BE IN SAFE CONDITION**

### 9.1 Die roll housing assembly e column assembly

- **Daily or production end** : check that the change gear surface is clean ; check for oil leakage from the pump housing shaft.
- **Monthly** : check the internal die roll housing; clean and lubricate with Teflon spray if necessary.
- Put teflon grease on idle gear.
- **Half yearly** : lubricate with Teflon spray the internal parts of column assembly and die roll housing.

### 9.2 Oil Roller assembly

- **Daily or production end** : empty the excess oil tank.
- **Weekly** : dismantle the oil rollers and clean the filters.

### 9.3 Chute assembly / mangle roll

- **Production end** : disassemble the chute assembly and the mangle rolls and wash all the pieces.
- **Weekly** : remove die rolls , chute assembly front cover plate and clean.

### 9.4 Pump housing assembly

- **Production end** : remove the pump from the pump housing, wash and replace the gaskets.
- Check the Pump Yoke cross bar . Replace if worn out.

### 9.5 Cooling drums

- **Production end** : check the overall conditions ; check the revolution: it must be regular, without any vibrations.  
Remove any gelatine residual without any metallic tool. Do not scratch.

### 9.6 Chiller / cooling system

- **Half yearly** : check for possible leakage in the case.  
Check the functions of the valves.

### 9.7 Tumble dryer

- **Production end**: start a general cleaning of the system

### 9.8 Service

The user is allowed to execute all the operations described with details in the chapter of the Standard Maintenance . Any other kind of operation on the machine must be asked for approval from the Technical Department of Pharmagel Engineering , describing any possible fault , operations or overhaul requested.

In certain circumstances Pharmagel Engineering can agree for a direct service, or can give authorization and detailed repair instructions at the user maintenance service.

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## 10 Troubleshooting

Problem	Reason	Adjustment
Cold spreader box	Damaged heating element	Replace heating element
	Electrical panel malfunction	Call service
Cold gelatine tank	Damaged heating element	Replace heating element
	Damaged electrical panel	Call service
Wrong ribbon thickness	The spreader box opening is wrong	Spreader box opening adjustment
Ribbon splits in two part	Hard blocks of gelatine in the spreader box opening	Clean way the blocks with hot water
Spreader boxes do not fill up	Gelatine viscosity too high	Check gelatine temperature
	Gelatine pipe is blocked	Check the pipeline heating is on – Stop the machine and clean the pipeline with hot water
Only one spreader box fills up	Gelatine pipe is blocked	Check the pipeline heating is on – Stop the machine and clean the pipeline with hot water
	Floating unit malfunction	Dismantle the spreader box ,clean up and set the floating unit.
	Floating unit not properly set	Set the unit and wait for spreader box reaction
Gelatine pour out of spreader box	Gelatine too much liquid	Lower the heating temperature
		Set floating unit
Air bubbles in the ribbon	Air bubbles in the gelatine tank	Substitute the gelatine tank
	Gelatine level too low	Stop the production for a while and let the level come up again.
Ribbon difficult separation from cooling drum	Cooling system malfunction	Call service
	Spreader box temperature too high	Check the probe possible malfunction

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The ribbons do not slide well between die rolls and the segment	Oil roller lubrication malfunction	Check the oil level in the back tank
		Check the “elastoflex “ fast connection of oil roller feeding
		Check the pressure set in the lubrication tanks
		Call service
Underweight capsule	Segment not perfectly centred	Put the segment in centre again
	Damaged segment	Replace the segment
	Blocked cavities	Dismantle and clean
	Fill leakage on gasket	Check plungers gasket and shut off valve gasket
	Fill leakage on spider tube	Check piepes and connections
	Air bubbles	Try to increase the injection pump stroke
Fill leakage in the net	Segment not perfectly centred	Put the segment in centre again
	Damaged segment	Replace the segment
	The segment do not	Check and eventually replace with a proper segment
	Continuous fill leakage from the segment	Air inclusion in the fill line gasket
Leakage capsule or bad welding	Die rolls not aligned	Check alignment and adjust
	Low segment temperature	Increase temperature
	Gelatine residual glued to the segment	Clean the segment surface with hot water wet cloth
	Too high production speed	Lower the speed
Deformed capsules	Ribbon not perfectly regular	Check and adjust
	Segment temperature too high	Lower the temperature
	Damaged segment teflon coating	Replace segment
	Gelatine residual in the die roll cavities	Check and replace
Air bubbles in the capsule fill	Segment not perfectly centred	Put segment in centre again
	Damaged segment	Replace segment
	Shut off valve in wrong position	Check
	Air bubbles in the hopper fill	Check the gasket between fill tank and fill pump , and the fill pump seal